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SECTOR 9

GERMANY AND DENMARK—THE RIVER ELBE TO HANSTHOLM

Plan.—This sector describes the River Elbe from its entrance to the Nord Ostsee Kanal, including the ports of Cuxhaven and Hamburg. The North Sea coasts of Germany and Denmark lying between the River Elbe and Hanstholm are described next, together with the islands of Helgoland and the other Nordfriesische Inseln. The descriptive sequence is SE through the approaches to the River Elbe and then N along the coasts of Germany and Denmark

General Remarks

9.1 The River Elbe is the most important river in German maritime commerce and provides access to the inland waterway system and the Nord Ostsee Kanal.

From this river, the coast extends 95 miles NNW to Horns Rev. The land is mostly low and is protected by dikes and sand dunes. The coast is irregular and several peninsulas extend W from its S part; however, there are no outstanding landmarks along this part of the mainland. The German/Danish border is situated about 70 miles N of the entrance to the River Elbe.

The entire coast is fronted by extensive shoals which extend a considerable distance from the shore. The Nordfriesische Inseln, a chain of islands, lie, with the exception of Helgoland, on this large shoal area. These shoals partly dry and numerous channels run between them, but there are mostly narrow, shallow, winding, and subject to frequent changes. They are used almost exclusively by fishing vessels and small craft with local knowledge.

Helgoland, one of the Nordfriesische Inseln, lies more than 22 miles from the coast. The remainder of the islands lie between 3 and 18 miles offshore. With the exception of Helgoland, these islands are generally low and consist of sand dunes and fertile marsh land. The shores of some of the islands are protected by sand dunes and others are diked to prevent erosion, but many of the smaller islands have neither.

The part of the North Sea that fronts this section of coast is relatively shallow and in general the depths decrease gradually towards the shore. Numerous wrecks lie throughout the area and may be found far offshore.

From Blavands Huk, on the mainland, to the E of Horns Rev, the coast extends about 100 miles N to Hanstholm. The coast in general is low and backed by sand dunes, but there are areas, particularly near the headlands, where cliffs attain heights of over 65m. Much of this coast has no outstanding landmarks except for several beacons.

The part of the North Sea that fronts this section of coast is relatively shallow and has two off-lying banks. The depths decrease gradually toward the shore and the bottom consists mainly of sand, although there are small areas of sand mixed with shells and stones.

Lille Fisker Banke, with a least depth of 31m, lies 63 miles W of Thyboron. A rather extensive bank, with a least depth of 27m and several 31m patches, lies close S and SW of Lille Fisker Banke.

Jyske Rev, with depths of 17 to 36m, lies 25 miles W and WNW of Thyboron.

Limfjorden, entered about 70 miles N of Blavands Huk, extends about 90 miles ENE to Hals, on the W side of the Kattegat. This fjord, which consists of a series of lakes with interconnecting channels, cuts through the N part of Jylland and converts the N part of that peninsula into an island.

There are no large ports situated along this N section of the coast. Ringkobing and Thyboron, both used by fishing vessels, are the only commercial harbors; however, several small local harbors and marinas are situated throughout Limfjorden.

Tides—Currents.—As a general rule, the currents in the coastal area covered by this sector set E along the N part of the Netherlands coast into the German Bight off the entrance to the Elbe and then set N along the Danish coast to Hanstholm. Winds between the SW and N usually increase the rate of the current and those between NE and S decrease its rate. If strong and long lasting prevailing winds continue, the direction of the current may be reversed.

The main offshore current has a mean rate of 0.5 knot and a rate up to 1.5 knots near the coast. At times, with a favorable strong wind, the current can attain a rate near the coast up to 4 knots, but be much less farther offshore.

Regulations.—For extracts from the Traffic Regulations applying to all German waterways and details of Extraodinary Large Vessels, see paragraph 8.1.

For information concerning right-of-way vessels in the approaches to the River Elbe, see Regulations under Approach Routes to the German Bight in paragraph 8.4.

Caution.—Numerous production platforms, wells, and gas and oil pipelines lie in the waters off the coast of Denmark and may best be seen on the charts. Extreme caution is advised when navigating in the vicinity of such facilities. Some of the production platforms are equipped with racons.

The principal oil and gas fields in the area are listed below:

1. Regnar Oil Field (55˚23'N., 5˚12'E.), with an SPM.
2. Dan Oil Field (55˚29'N., 5˚07'E.).
3. Kraka Oil Field (55˚24'N., 5˚06'E.).
4. Skjold Oil Field (55˚32'N., 4˚55'E.).
5. Gorm Oil Field (55˚35'N., 4˚46'E.).
6. Dagmar Oil Field (55˚35'N., 4˚38'E.).
7. Rolf Oil Field (55˚36'N., 4˚30'E.).
8. Tyra Gas Field (55˚44'N., 4˚47'E.).
9. Roar Gas Field (55˚46'N., 4˚39'E.).
10. Valdemar Oil Field (55˚50'N., 4˚34'E.).
11. Syd Arne Gas Field (56˚05'N., 4˚14'E.).
12. Svend Gas Field (56˚10'N., 4˚10'E.).
13. Harald Gas Filed (56˚21'N., 4˚16'E.).
14. Siri Oil Filed (56˚29'N., 4˚55'E.).

For oil and gas fields located in the North Sea and lying W and NW of the above fields, see paragraph 1.4.

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The River Elbe

9.2 The River Elbe is 730 miles long and a major waterway. It is navigable by inland vessels and connected to the extensive European inland waterway systems. The principal ports of Cuxhaven and Hamburg are situated 26 and 78 miles, respectively, above the entrance of the river.

The River Elbe also provides access to the Nord Ostsee Kanal at Brunsbuttel, 42 miles above the entrance.

The outer part of the river reaches the sea through a broad estuary situated at the SE head of the German Bight. Extensive shoal banks and drying sands front the mainland in the vicinity of the estuary. They extend up to 20 miles offshore on the N side and up to 15 miles offshore on the S side.

Norder Grunde (53˚55'N., 8˚08'E.), lying on the S side of the estuary, extends far out to sea and its outer part is very steep-to. It is reported that soundings do not give any early warning when approaching this large shoalbank. During periods of heavy seas, the N side of Norder Grunde is indicated very clearly by breakers and its shallow areas are easily noticeable through the surf.

Grosser Vogelsand (54˚01'N., 8˚25'E.), lying on the N side of the estuary, is constantly shifting. Drying flats extend along the SE side of this shoal. Gales from the W and N form heavy surf on this shoal, particularly on its NW part.

Elbe Lighted Buoy (54˚00'N., 8˚07'E.), equipped with a racon, is moored in the outer approaches, 11 miles WNW of Scharhorn.

Grosser Vogelsand Tower (54˚00'N., 8˚29'E.), 45m high with two overhanging stories and a helicopter platform, stands 2.5 miles NNE of Scharhorn. It is prominent and floodlit at night.

Grosser Vogelsand Tower

The main river entrance lies between Grosser Vogelsand, the outermost shoalbank on the N side, and Scharhorn Riff (53˚58'N., 8˚20'E.), the outermost shoalbank on the S side. The entrance channel extends E for 8 miles and then ESE and SE to the port of Cuxhaven. The river channel then follows a general E direction for 13 miles to Brunsbuttel.

The islands of Scharhorn (53˚57'N., 8˚26'E.) and Neuwerk (53˚55'N., 8˚30'E.) form the outer land features and stand on an extensive sand flat at the S side of the river entrance.

The mainland on both sides of the river is low and diked; it is reported that the landmarks on the mainland are not visible until vessels are fairly close to the shore.

Neuwerk Light (53˚55'N., 8˚30'E.) is shown from a conspicuous brick tower, 38m high, standing on the S side of the island. A prominent white radar tower, 60m high, is situated on the NW side of the island, 0.6 mile NNW of the light. A conspicuous beacon (North Beacon) stands 0.3 mile NW of the radar tower.

A long training wall, marked by beacons, extends from the mainland in the vicinity of Cuxhaven (53˚52'N., 8˚43'E.). It projects in a general NW direction for about 5 miles to Mittelgrund (53˚57'N., 8˚35'E.), a drying shoal area.

Neuwerk Light

9.3 Neuer Leuchtergrund (53˚59'N., 8˚31'E.), a detached shoal, has a least depth of about 6m. It lies 1.7 miles NE of Scharhorn and divides the main channel into two fairways.

Mittelrinne (53˚58'N., 8˚33'E.), the main fairway, passes S of Neur Leuchtergrund and is maintained by dredging.

Norderrinne (53˚59'N., 8˚33'E.), a secondary fairway, passes N of Neuer Leuchtergrund and is used by departing vessels (see Regulations in paragraph 9.1). This fairway has a least depth of about 7m; however, it is reported to be not maintained by dredging and subject to frequent changes. It rejoins the main fairway about 1.7 miles SE of the E end of Neuer Leuchtergrund.

Kugel Beacon (53˚54'N., 8˚41'E.) stands at the N extremity of the mainland, NNW of Cuxhaven. It is prominent and illuminated at night.

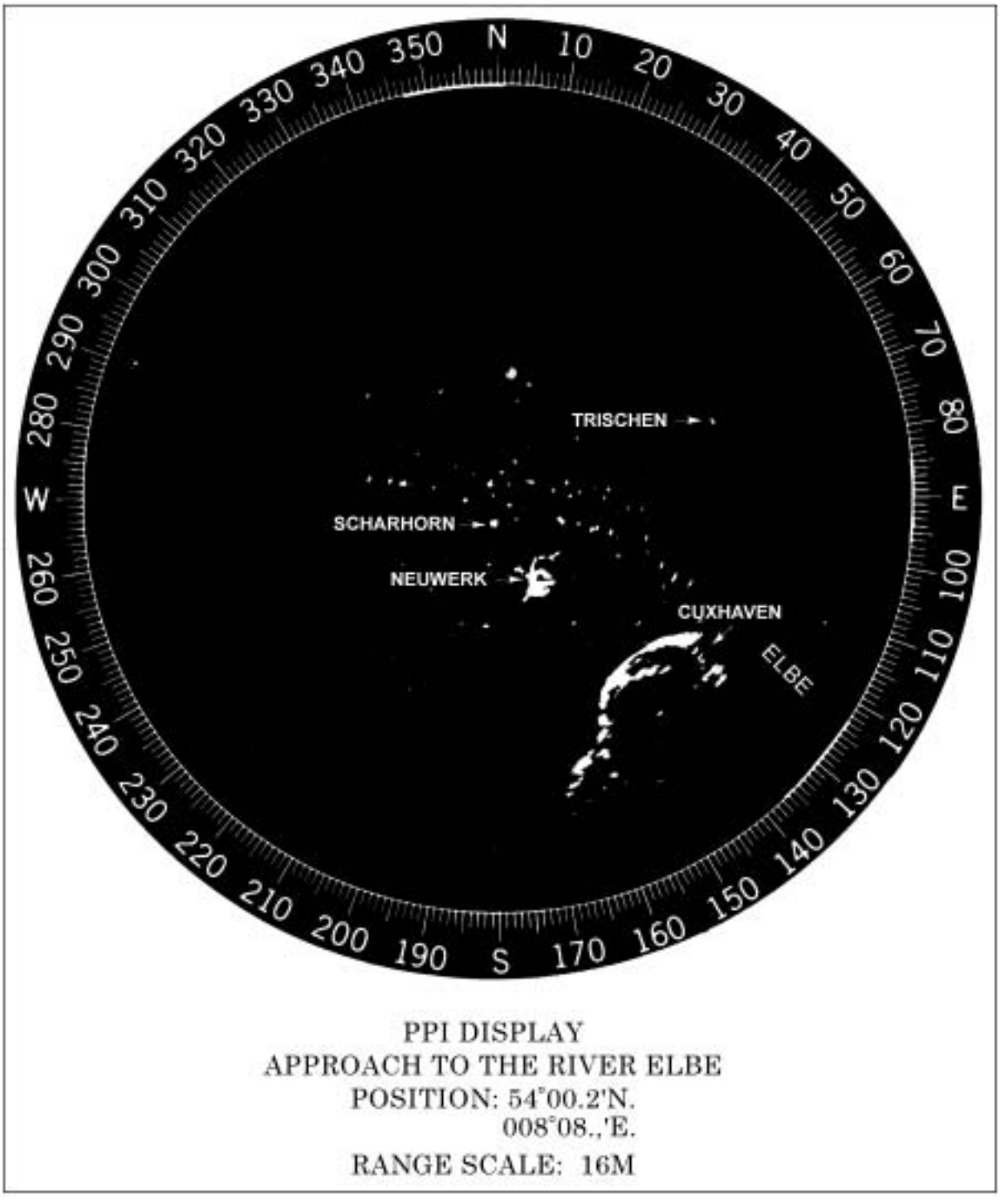
Cuxhaven Radar Tower (53˚52'N., 8˚43'E.), a tall building with a semicircular front, stands in the N part of the port. It has a flat top surmounted by a radar scanner and is very prominent. A conspicuous radio mast, 130m high, is situated 0.2 mile SSW of this tower.

The approach and main entrance fairways are marked by lighted buoys and indicated by sector lights. The fairways within the river are also indicated by lighted ranges. In addition, radar conspicuous beacons have been established at the entrance to the river; these are situated close outside the main fairway and many are floodlit.

The small and minor channels that lead among the shoal banks in the estuary are marked by perches and beacons. These

Return to paragraph: 8.21

PPI DISPLAY
ELBE ENTRANCE
POSITION: 53°59.5' N.
008°26.5'E.
RANGE SCALE: 16M



PPI DISPLAY
APPROACH TO THE RIVER ELBE
POSITION: 54°00.2'N.
008°08.,'E.
RANGE SCALE: 16M

passages should only be used small vessels with local knowledge.

All of the above aids may best be seen on the chart.

Ice.—In general, ice is found in the river in most winters, but it is only during severe winters that it forms in sufficient quantity to be of any concern. Icebreakers are used, and from the sea to Hamburg, the fairways are kept open. In severe winters, ice may cause difficulties within the seldom visited small harbors and inlets along the river, but the major ports may be entered with no trouble.

The first ice forms in the upper river near Hamburg and then spreads downstream towards the sea. The earliest ice generally appears at Hamburg about the middle of December and in the vicinity of Neuwerk about 2 weeks later. However, during severe winters, ice has been observed at Hamburg as early as the first week of November.

The ice generally disappears about the same time at Neuwerk as at Hamburg. It generally remains as long as the beginning of March and, during severe winters, may last until late March. During rainy weather, the ice disappears very quickly.

The river never freezes over completely as the ice is, more or less, kept in motion by the tidal currents. With the incoming current, the ice is heaped together and may come to rest at the bends in the river. With the outgoing current, which lasts longer than the incoming current, the ice is driven seaward.

Tides—Currents.—In the vicinity of the island of Scharhorn, the tide rises about 3.3m at springs and 2.9m at neaps.

Winds from the W to NW raise the water level and those from the E to SE lower it. Winds from the SSE and NNW do not appreciably affect the water level. Continued E winds can maintain the abnormally low water level for some time and, in exceptional cases, the water level has been reported to rise as much as 4m above the MHW and drop as low as 3m below the MLW. At Hamburg, rises of 1.9 to 2.5m may be caused by heavy storm floods.

The presence of heavy ice tends to reduce the tidal range, particularly that of the HW; reductions up to 1m have been observed.

In the approach to the river, the tidal currents set in an E and W direction. On nearing the entrance, they gradually assume a SE and NW direction. In general, the E or incoming current begins to set 30 minutes to 1 hour 30 minutes after LW at Helgoland. The W or outgoing current begins to set 1 hour to 2 hours after HW. Between the changes of the two currents, there is a very defined period of slack water. Under normal conditions, these currents attain rates of 1 to 1.5 knots; however, the rates and durations are greatly affected by the wind.

In the entrance, the incoming current is stronger on the S side of the channel and generally begins to set about 1 hour earlier than the current on the N side. The incoming current first sets across the shoals in the estuary and through the channels between the drying sands. The current coming across the flats near Scharhorn sets diagonally over Mittelgrund and then E towards the training wall and the main fairway.

In the vicinity of Cuxhaven, the incoming current on the N side of the channel is stronger and lasts longer than the current on the S side.

The outgoing current in the entrance begins to set sooner on the N side than the current on the S side. At first, it sets N along the S edge of Grosser Vogels and, as the water level is lowered and the drying sands appear, a branch of this current sets through the channels between these drying sands and another branch sets towards the sea through the main fairway. In the vicinity of Midem Sand, part of the current sets N and another part sets through the main channel, consequently increasing the velocity of the current off Cuxhaven.

Turbulent water may be encountered off the SW side of Medem Sand. Somewhat rough seas form on the N side of the channel with strong W and NW winds at almost the end of the outgoing current. On the S side of the channel, where the incoming current is beginning to set, the water remains calm. Lines of foam may indicate the edge between the currents setting in different directions and at different rates.

In the main channel off Scharhorn, currents, during calm weather and normal conditions, attain rates up to 3.5 knots. In the main channel E of Mittelgrund, the flood current attains rates of 2.5 knots at springs and 1.8 knots at neaps. The ebb current attains rates of 2.3 knots at springs and 1.3 knots at neaps.

Depths—Limitations.—The main river fairway has projected dredged depths of 14.7m as far as Cuxhaven and 14.4m (2002) as far as Hamburg, which stands about 78 miles above Elbe Lighted Buoy.

Generally, vessels not dependent on the tide can transit to Hamburg with drafts (fresh water) up to 12.8m. It is reported (2002) that container vessels with a beam exceeding 32.3m and not dependent on the tide are limited to a draft (fresh water) of 12.7m.

The following maximum drafts (fresh water) for tide-dependent vessels are permitted provided the maintained channel depths are available and an average tide is expected:

1. Vessels up to 360m in length or 63m beam—Inbound draft of 14.2m and outbound draft of 12.7m.
2. Vessels up to 350m in length or 55m beam—Inbound draft of 14.5m and outbound draft of 13.1m.
3. Vessels up to 340m in length or 50m beam—Inbound draft of 14.8m and outbound draft of 13.4m.
4. Vessels up to 330m in length or 45m beam—Inbound draft of 15.1m and outbound draft of 13.7m.

Pilotage.—See Pilotage (paragraph 8.3) and Regulations (paragraph 8.4) under Approach Routes to the German Bight for pilotage information and regulations concerning large vessels and vessels carrying dangerous cargo approaching or navigating in the German Bight (Deutsche Bucht) and intending to enter the River Ems, the River Jade, the River Weser, or the River Elbe.

Such vessels approaching the River Elbe, including those using the German Bight Western Approach TSS, embark the pilot at the Inner Deutsche Bucht (German Bight) boarding position, which is located about 2 miles WNW of E3 Lighted Buoy (54° 04'N., 7° 55'E.).

The regulations below apply to all other vessels.

Pilotage on the River Elbe is compulsory for the following vessels:

1. Tankers carrying dangerous or polluting cargo, laden and unladen, if not declared gas-free.
2. Vessels over 90m in length or 13m beam.

Pilots can be contacted by VHF and normally board about 1.5 miles ESE of Elbe Lighted Buoy (54°00'N., 8°07'E.).

Vessels should send an ETA and a request for pilotage to Elbelotse Brunsbuttel at least 12 hours before arrival at the

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pilot boarding position or immediately upon departure from nearby ports (for short voyages).

The pilot vessel has a black hull, with "Lotse" painted in white on both sides, and a yellow stack.

The river is divided into two pilotage districts. Sea pilots take vessels as far as Brunsbuttel (53˚53.5'N., 59˚08.8'E.), where river pilots board and take vessels as far as Hamburg or the Nord Ostsee Kanal.

Regulations—Traffic Control.—See paragraph 8.5 (Approach Routes to the German Bight) for information concerning the Vessel Traffic Service (VTS) system applying to vessels navigating within the waters of the German Bight and intending to enter the River Ems, the River Jade, the River Weser, or the River Elbe.

A local Vessel Traffic Service (VTS) system operates in the River Elbe. This VTS system is mandatory for the following vessels:

1. All vessels over 50m in length (including towed or pushed composite units) within the areas of Cuxhaven Elbe Traffic and Brunsbuttel Elbe Traffic and all ocean-going vessels over 100m in length (including towed or pushed composite units) within the area of Hamburg Port Traffic.
2. Vessels carrying dangerous cargo (gas, chemicals, petroleum, or petroleum products) in bulk.
3. Unloaded tankers if not cleaned, degassed, or completely inerted after carrying petroleum or petroleum products with a flashpoint below 35 C.
4. Nuclear-powered vessels.

The Elbe VTS system is divided into three operating areas, as follows:

1. Cuxhaven Elbe Traffic, extending from Elbe Lighted Buoy (54˚00'N., 8˚07'E.) to Nos. 53/54 Lighted Buoys (53˚ 51'N., 9˚02'E.).
2. Brunsbuttel Elbe Traffic, extending from Nos. 53/54 Lighted Buoys to No. 125 Lighted Buoy (53˚34'N., 9˚44'E.).
3. Hamburg Port Traffic, above No. 125 Lighted Buoy.

Vessels entering the VTS area of Cuxhaven Elbe Traffic must maintain a continuous listening watch on VHF channel 71 or 16. It is mandatory to send the following reports:

1. Sailing Plan (SP)—An SP must be sent to VTS Center Cuxhaven Elbe Traffic on VHF channel 71, if not already reported by an SP to VTS German Bight Traffic (see paragraph 8.5), as follows:
   a. 30 minutes before entering the VTS area of Cuxhaven Elbe Traffic from sea.
   b. Before leaving a harbor or berth within the VTS area of Cuxhaven Elbe Traffic.
2. Position Report (PR)—A PR must be sent to VTS Center Cuxhaven Elbe Traffic on VHF channel 71, as follows:
   a. When entering the VTS area of Cuxhaven Elbe Traffic (on passing Elbe Lighted Buoy or Nos. 53/54 Lighted Buoys).
   b. When leaving a harbor or berth within the VTS area of Cuxhaven Elbe Traffic.

Vessels entering the VTS area of Brunsbuttel Elbe Traffic must maintain a continuous listening watch on VHF channel 68 or 16. It is mandatory to send the following reports:

1. Sailing Plan (SP)—An SP must be sent to VTS Center Brunsbuttel Elbe Traffic on VHF channel 68, if not already reported by an SP to an adjacent VTS center, as follows:
   a. Before leaving a harbor or berth within the VTS area of Brunsbuttel Elbe Traffic.
   b. Before leaving the Nord-Ostee Kanal (Kiel Canal) locks in Brunsbuttel.
2. Position Report (PR)—A PR must be sent to VTS Center Brunsbuttel Elbe Traffic on VHF channel 68, as follows:
   a. When entering the VTS area of Brunsbuttel Elbe Traffic (on passing Nos. 53/54 Lighted Buoys or No. 125 Lighted Buoy).
   b. When leaving a harbor or berth within the VTS area of Brunsbuttel Elbe Traffic.

Vessels entering the VTS area of Hamburg Port Traffic must maintain a continuous listening watch on VHF channel 74. It is mandatory to send the following reports:

1. Sailing Plan (SP)—An SP must be sent to VTS Center Hamburg Port Traffic on VHF channel 14, if not already reported to VTS Hamburg Port Traffic, as follows:
   a. When entering the VTS area of Hamburg Port Traffic.
   b. When at a berth within the VTS area of Hamburg Port Traffic.
2. Position Report (PR)—A PR must be sent to VTS Center Hamburg Port Traffic on VHF channel 14 as follows:
   a. Inbound vessels—When passing the limits of the VTS area of Hamburg Port Traffic (on passing No. 125 Lighted Buoy) and on arrival at the berth.
   b. Vessels shifting berth—When leaving the present berth and on arrival at the new berth.
   c. Outbound vessels—When leaving the berth and when passing the limits of the VTS area of Hamburg Port Traffic (on passing No. 125 Lighted Buoy).
3. Further Position Report (PR)—Inbound and outbound vessels, and vessels shifting their berth, must send a further PR to all vessels and land-based stations on VHF channel 74 when passing the following reporting points:
   a. No. 125 Lighted Buoy.
   b. No. 132 Lighted Buoy.
   c. Parkhafen (53˚ 32.5'N., 9˚ 54.2'E.).
   d. No. 135/KS1 Lighted Buoy.
   e. Vorhafen (53 ˚32.6'N., 9˚ 57.0'E.).
   f. Uberseebrucke (53 ˚32.6'N., 9˚ 58.7'E.).
   g. Amerikahoft (53˚ 32.2'N., 9˚ 59.6'E.).
   h. Norderelbebrucken (53˚ 32.0'N., 10 ˚01.5'E.).
   i. Dove-Elbe (53˚ 30.5'N., 10˚ 03.5'E.).
   j. Kohlbrandbrucke (53˚ 31.4'N., 9˚ 56.4'E.).
   k. Kattwykbrucke (53˚ 29.7'N., 9 ˚57.2'E.).
   l. Rethebrucke (53˚ 30.3'N., 9˚ 58.3'E.).

Incident Reports (IR) and Deviation Reports (DR) must be sent to the appropriate VTS Traffic Center as necessary.

The format for the SP and RP can be found under Regulations-Traffic Control (Approach Routes to the German Bight) in paragraph 8.5.

Radar advice is provided on request, or if instructed by the VTS Center (Cuxhaven Elbe Traffic on VHF channel 71, Brunsbuttel Elbe Traffic on VHF channel 68, or Hamburg Port Traffic on VHF channel 14) in German, or on request in Eng-

lish. The request should include the vessel's name, call sign, and position.

This service is provided when the visibility is less than 3,000m, when the pilot vessel is in a sheltered position, when lighted buoys are withdrawn due to ice, when required by the traffic situation, or when requested by a vessel.

Radar advice within the approaches and river entrance is provided by the following stations:

1. Elbe Approach West Radar—VHF channel 65—GB Lightfloat to Elbe Lighted Buoy.
2. Elbe Approach East Radar—VHF channel 19— Elbe Lighted Buoy to No. 5 Lighted Buoy.
3. Scharhorn Radar—VHF channel 18—No. 5 Lighted Buoy to No. 15/Neuwerk Reede Lighted Buoy.
4. Neuwerk Radar—VHF channel 5—No. 13/Neuwerk Reede1 Lighted Buoy to No. 29 Lighted Buoy.

Information (weather, depths, maximum drafts, dredging, and traffic) broadcasts are made, as follows:

1. By Cuxhaven Elbe Traffic at 35 minutes after every hour for the outer River Elbe on VHF channel 71, in German and English. Situation broadcasts are also supplied on demand.
2. By Brunsbuttel Elbe Traffic at 5 minutes after every hour for the inner River Elbe on VHF channel 68, in German and English. Situation broadcasts are also supplied on demand.
3. By Hamburg Port Traffic, which provides situation broadcasts on demand in German, or on request in English.

Regulations—General.—Extraordinary Large Vessels are defined for the River Elbe as those exceeding 330m in length or 45m beam. Such vessels have special transit restrictions placed on them and permission must be obtained at least 24 hours prior to entering the river (see paragraph 8.1).

An Extraordinary Large Vessel, which is departing, may not pass Seemanshoft (53˚32.4'N., 9˚52.8'E.) during the period from 3 hours before HW at St. Pauli until HW if there is a tide-dependent vessel inbound.

Oil, gas, and chemical tankers, as well as tug and tow formations which transport or have transported hazardous cargo in bulk and are not gas-free, may not enter the River Elbe unless the visibility is at least 1,000m.

The VTS Traffic Center may issue exemptions from the established regulations if the length of the vessel does not exceed 140m or the freshwater draft does not exceed 8.5m, if no technical or equipment defects can be detected, if the visibility is over 500m, and the traffic conditions are permitting.

Right-of-way vessels proceeding to the entrance of the Elbe should display the appropriate lights and signals as per Rule 27(b) of the International Regulations for Preventing Collisions at Sea (1972). For more details concerning right-of-way vessels, see Regulations (Approach Routes to the German Bight) in paragraph 8.4.

With prior permission from Cuxhaven Elbe Traffic VTS, the following vessels, when departing, may use Mittelrinne (53˚58'N., 8˚33'E.), the main fairway, instead of Norderrinne:

1. Car carriers, container, and ro-ro vessels over 170m in length or 28m beam.
2. All other vessels over 220m in length or 28m beam.
3. All other vessels unable to use Norderrinne because of their draft.

No overtaking is permitted by any vessel within Mittelrinne, the main fairway, between No. 13/Neuwerk Reede Lighted Buoy (53˚58'N., 8˚28'E.) and No. 29 Lighted Buoy (53˚55'N., 8˚40'E.).

A vessel departing via Norderrinne must not overtake on the port side of a vessel departing via Mittelrinne when below No. 29 Lighted Buoy (53˚55'N., 8˚40'E.).

Anchorage.—An outer anchorage area for large and deep-draft vessels lies adjacent to the W side of the Jade Approach TSS (54˚06'N., 7˚32'E.) and may best be seen on the chart. A number of wrecks and obstructions lie within this area.

Elbe Approach Reede (54˚04'N., 7˚45'E.), an outer anchorage area for vessels waiting for the tide, lies centered about 5 miles W of E3 Lighted Buoy (54˚04'N., 7˚ 55'E.) and may best be seen on the chart.

Aussenelbe Reede (54˚03'N., 8˚10'E.), an anchorage area, with depths of 14 to 18m, lies in the approaches to the river, 3 miles NNE of Elbe Lighted Buoy (54˚00'N., 8˚07'E.).

Neuwerk Reede (53˚58'N., 8˚30'E.), an anchorage area available for vessels carrying explosives, lies on the S side of Mittelrinne, 1.5 miles S of Grosser Vogelsand Tower, and has depths of 8 to 16m.

Medem Reede (53˚51'N., 8˚46'E.), an anchorage area available for vessels carrying dangerous cargo, lies close E of the main fairway and has depths of 6 to 12m.

The above anchorage areas are marked by buoys and their limits may best be seen on the chart.

Directions.—See paragraph 8.4 (Approach Routes to the German Bight) for information concerning the Traffic Separation Schemes (TSS) and Deep-Water Routes situated in the outer approaches to the River Elbe.

An IMO-adopted Traffic Separation Scheme (TSS) is situated in the vicinity of Elbe Lighted Buoy (54˚00'N., 8˚07'E.) and may best be seen on the chart.

Inbound vessels for the River Elbe should pass to the S of Elbe Lighted Buoy; outbound vessels should pass to the N of Elbe Lighted Buoy.

Radar tracks, designated green for inbound and red for outbound, have been established within the fairway channels and may best be seen on the chart.

Caution.—The shoals lying in the estuary are usually approached before land is sighted and for this reason constitute a serious hazard for vessels intending to enter the river. These shoals change constantly under the action of the tidal currents and heavy seas. Consequently, their charted positions do not always correspond with the actual positions.

In the entrance to the river, NW gales, particularly with an outgoing current, may cause very heavy seas, high breakers, and heavy ground swells.

In the approaches and the river fairways, the tidal currents may set diagonally across the direction of the traffic lanes and the channel. Care must be taken when stopping for any reason with the tidal currents at full strength.

Not all areas have been cleared of mines. Vessels are advised to only anchor in the designated berths and to keep strictly to the recommended routes and channels.

The sides of the sandbanks facing the main fairway in the approaches to the river are generally steep-to. In the case of a grounding on one of these banks, it is likely that sand will be scoured away from the stem and stern, resulting in the back of

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the vessel being broken. Therefore, refloating of the vessel should be accomplished as soon as possible.

Several National Park Wildlife Sanctuaries, the limits of which are shown on the chart, lie along the banks adjacent to the main channel. Entry into these areas is restricted.

Numerous wrecks and foul areas lie in the approaches and river channels and may best be seen on the chart.

Several submarine cables and pipelines lie across the river channels and may best be seen on the chart.

At times, small ice buoys, which are not radar conspicuous, may replace the normal navigational aids.

Ferries cross the river at various places which are indicated on the chart.

High speed craft operate between Cuxhaven and Hamburg and also between Cuxhaven and Helgoland.

Measured distances are established in the main fairway in the vicinity of Pagensand (53˚42'N., 9˚31'E.) and Falkenstein (53˚34'N., 9˚46'E.). They are marked by beacons and may best be seen on the chart.

Fixed fishing equipment, such as eel traps, may be located within the river outside of the main fairway, especially near banks.

A local magnetic anomaly is reported to occur in the vicinity of a wreck lying near No. 42 Lighted Buoy (53˚51'N., 8˚50'E.).

The banks of the river are protected, in many places, by numerous groynes, which extend varying distances into the channel.

Cuxhaven (53˚52'N., 8˚43'E.)

World Port Index No. 30800

9.4 Cuxhaven is situated on the S bank of the Elbe, about 25 miles above Elbe Lighted Buoy, and is entered directly from the main river fairway. In addition to being a commercial port, the harbor provides extensive facilities for fishing vessels, offshore exploration support vessels, and pleasure craft.

Tides—Currents.—The tides rise about 3.3m at springs and 2.9m at neaps.

Winds from the W raise the water level at the port and strong E winds lower it.

In the roadstead, the incoming current begins to set 3 hours 45 minutes before HW and attains a rate up to 3 knots at springs. The outgoing current begins 1 hours 15 minutes after HW and attains a rate up to 5 knots at springs.

Strong W winds increase the rate of the incoming surface current by 0.5 to 1 knot and strong E winds increase the rate of the outgoing surface current by up to 1 knot.

Depths—Limitations.—The main fairway has a projected dredged depth of 14.7m as far as the port. For details of maximum drafts (fresh water) for tide-dependent vessels transiting the river, see Depths-Limitations for the River Elbe in paragraph 9.3.

The harbor consists of several tidal basins, a wet dock, and a number of riverside quays. The main facilities are described below.

Fahrhafen, a basin, and Seebarderbrucke, a riverside quay 300m long, are situated in the N part of the port and form a passenger ferry terminal. Ro-ro vessels up to 180m in length and 9m draft can be handled.

Steubenhoft, a riverside quay, is 400m long and has depths of 14 to 14.5m alongside. It is mostly used by passenger vessels.

Alter Fischereihafen, a tidal basin, has a depth of 5.5m and is mostly used by fishing vessels. Vessels up to 80m in length, 18m beam, and 4.5m draft can enter.

Neuer Fischereihafen, a wet dock, has a depth of 9m. It is entered through a lock, 190m long and 24m wide. This basin is mostly used by fishing boats and support vessels.

Amerikahafen, a tidal basin, is mostly used by general cargo and bulk vessels. Lentzkai, a quay located at the W side, provides 430m of berthage, with a depth of 7m alongside. Humberkai, a quay located at the E side, provides 110m of berthage, with a depth of 7m alongside. A floating dock is situated in the S part of this basin.

Europakai, a riverside quay with ro-ro ramps, provides 700m of berthage, with depths of 12 to 15m alongside.

Vessels up to 350m in length and 14m draft can be accommodated in the port.

Anchorage.—The roadstead anchorage area, with depths of 5 to 10m, lies on the NE side of the fairway adjacent to the port. It is marked by buoys and may best be seen on the chart. The holding ground is reported to be poor during gales, especially when a strong tidal current is running.

Caution.—The tidal currents in the vicinity of the port are very strong and set across the entrances of the basins.

9.5 **Altenbruch** (53˚50'N., 8˚46'E.), a small town, stands on the S side of the river, 3 miles above Cuxhaven. It can be easily identified by a prominent church with a double spire. The harbor basin, used only by small craft, lies at the mouth of Die Braake. It provides access, via a lock, to a shallow canal which leads to the town, 1 mile S.

Otterndorf (53˚49'N., 8˚54'E.), another small town with a prominent church, stands on the S side of the river, 4.5 miles above Altenbruch. The Medem River and the Hadelner Kanal enter the Elbe through a common waterway which leads to the town, 1 mile inland.

Die Oste (53˚51'N., 8˚59'E.) is entered on the S side of the Elbe, about 11 miles above Cuxhaven. This narrow river is navigable by small coasters as far as Bremervorde, about 40 miles SE. The water level is controlled by a flood barrage, with a navigable width of 22m, situated 2.5 miles above the entrance. The fairway has a depth of 4m as far as Osten (53˚42'N., 9˚11'E.) and 2.2m as far as Bremervorde.

9.6 **Brunsbuttel** (53˚54'N., 9˚09'E.) (World Port Index No. 30710), a small town, stands on the N side of the Elbe, at the W entrance of the Nord Ostsee Kanal. The port consists of an outer harbor, with riverside berths, and an inner harbor, situated within the first section of the canal.

Tides—Currents.—The tides rise about 3.1m at springs and 2.7m at neaps.

Depths—Limitations.—The main fairway has a projected dredged depth of 14.4m as far as the port.

Elbehaven Brunsbuttel, a riverside quay, is situated in the outer harbor, 1.2 miles E of the canal entrance. It provides about 1,100m of berthage, with dredged depths of 14.7 to 16.1m alongside. This quay has facilities for general cargo, container, bulk, LPG, and tanker vessels.

Return to paragraph: 9.7

Vessels up to 220m in length and 12m draft, except laden gas tankers, can reach and depart from this quay at any state of the tide. Tide-dependent vessels up to 350m in length and 55m beam can be accommodated alongside the quay, with fresh water drafts up to 14.5m (tankers 13.8m).

Brunsbuttel Binnenhaven, the inner harbor, is situated in the widened part of the canal and extends up to about 2.5 miles above the entrance locks. The fairway in this part of the canal is dredged to a depth of 12m.

Several quays, a number of dolphin berths, and two basins are situated along the sides of the canal within the inner harbor and have depths up to 12m alongside. They provide facilities for tanker, gas, chemical, and bulk vessels.

Vessels are limited to a maximum length of 235m due to the restrictions of the canal locks (see paragraph 9.7). Vessels up to 10.4m draft can enter the inner harbor, via the lock, on a sliding scale depending on their beam. Vessels up to 27m beam can be handled with drafts up to 10.4m; vessels up to 29m beam can be handled with drafts up to 9.5m; and vessels up to 32.5m beam, the maximum permitted, can be handled with drafts up to 8m.

An overhead cable, with a vertical clearance of 40m, spans the inner harbor, 1.5 miles above the lock.

Aspect.—Brunsbuttel radar tower, 36m high with a wide cylindrical top, stands at the entrance to the locks and is conspicuous.

Two prominent chimneys, 70m and 103m high, stand at a power station on the N side of the river, 2 miles E of the entrance to the locks. A conspicuous chimney, 178m high, stands, 1.3 miles N of the power station.

Regulations.—An approach area, the limits of which are shown on the chart, lies on the river side of the entrance to the locks and is marked by buoys. Passage through this area is generally restricted to vessels entering or leaving the canal or inner harbor. However, with prior permission, vessels over 160m in length berthing at Elbehaven Brunsbuttel or anchoring in Nordwest Reede during the flood tide may enter.

Anchorage.—An extensive anchorage area, for vessels waiting to enter the Nord Ostee Kanal, extends along the N side of the river fairway, on both sides of the entrance to the locks. This roadstead consists of four sections. Neufeld Reede West, Neufeld Reede Oste, and Nordwest Reede are situated W of the canal entrance and Nordostreede is situated E of it.

Sudreede, a narrow anchorage area, extends along the S side of the main river fairway, close E of the canal entrance. It may only be used by vessels less than 120m in length.

The limits of the above anchorage areas are marked by buoys and may best be seen on the chart.

Nord Ostsee Kanal (Kiel Canal) (53˚53'N., 9˚08'E.)

9.7 The Nord Ostsee Kanal, also known as the Kiel Canal, is a connecting waterway between the North Sea and the Baltic Sea. The North Sea terminal is at Brunsbuttel and the Baltic Sea terminal is at Holtenau, on Kieler Forde. The canal, which has been widened and deepened, was originally opened to regular traffic in 1895.

The canal is 53 nautical miles long and has a least depth of 11m. It has a surface width between 103m and 162m and a bottom width between 44m and 90m.

The latest information concerning the canal is now available on the Internet, as follows:

Kiel Canal Home Page

http://www.keil-canal.org

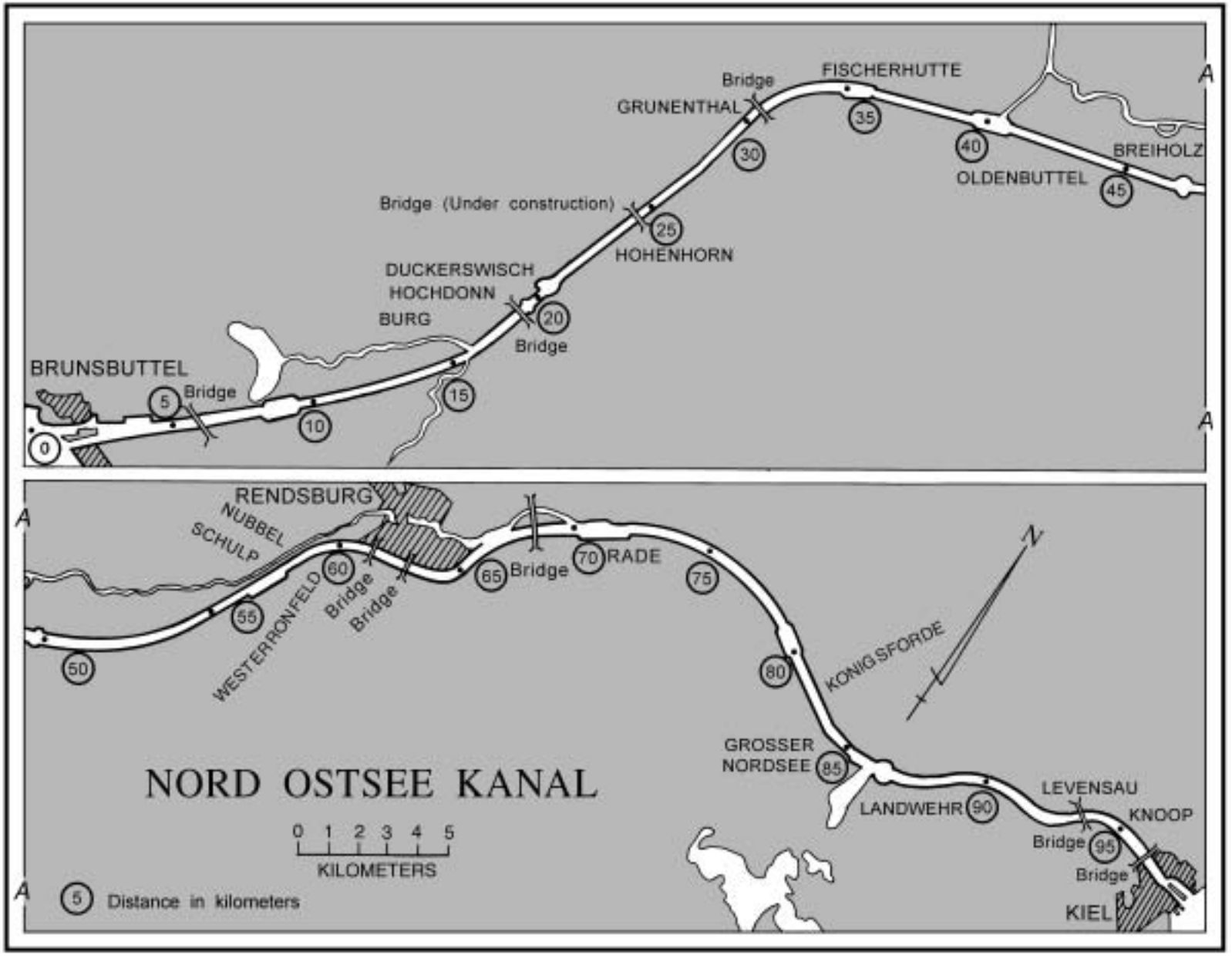
Nord Ostsee Kanal (Kiel Canal)

Canal entrance at Brunsbuttel

Ice.—Ice does not appear in the canal before Christmas each year and generally begins to form at the beginning of January. Under normal conditions, ice obstruction lasts only from 4 to 6 weeks; however, during severe winters, the ice may remain until the beginning of April. The continuous operation of ice-breakers and the passage of high-powered vessels normally keeps the canal clear enough for transit.

Depths—Limitations—(Canal Locks).—Sets of double canal locks are situated at Brunsbuttel and at Holtenau, near the port of Kiel.

At Brunsbuttel, there are two sets of double locks. At present, only the new locks are being used as they are considerably larger than the old ones. The double locks lie parallel to each other, and normally one is used for entering the canal and the other for leaving it.



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The new locks have a usable length of 310m and a usable width of 42m. They have sliding gates and each lock is subdivided into two chambers. The depth on the sills is 14m below the mean water level of the canal which corresponds to a river depth of 12.5m. Vessels up to 10.4m draft can use the lock.

The old locks at Brunsbuttel have a usable length of 125m and a width of 22m. Vessels up to 6m draft can use this lock.

An approach area, the limits of which may be seen on the chart, lies on the river side of the entrance to the locks. Passage through this area is generally restricted to vessels entering or leaving the canal or inner harbor.

Depths—Limitations—(Canal Transit).—The maximum permitted draft for transit of the canal is 9.5m. Vessels with drafts up to 10.4m may enter the canal in order to berth at the inner harbor of Brunsbuttel (see paragraph 9.6).

The canal, which operates 24 hours, can accommodate vessels up to a maximum of 235m in length and 32.5m beam with drafts in proportion up to the maximum permitted. For example:

1. The maximum draft of 9.5m applies to all vessels up to 160m in length.
2. Vessels 160m in length, with a beam of 20 to 27m, are allowed a maximum draft of 9.5m.
3. Vessels 160m in length, with a beam of 32.5m, are allowed a draft up to 8.9m.
4. Vessels 190m in length, with a beam of 24m, are allowed a draft up to 9.1m.
5. Vessels 190m in length, with a beam of 32.5m, are allowed a draft up to 8m.
6. Vessels 210m in length, with a beam of 24m, are allowed a draft up to 8.5m.
7. Vessels 210m in length, with a beam of 32.5m, are allowed a draft up to 7.4m.
8. Vessels 235m in length, with a beam of 20m, are allowed a draft up to 8.3m.
9. Vessels 235m in length, with a beam of 27m, are allowed a draft up to 7.4m.
10. Vessels 235m in length, with a beam of 32.5m, are allowed a draft up to 7m.

Several bridges and overhead cables, with least vertical clearances of 40m, span the canal.

The average time of transit usually requires from 8 to 10 hours, which includes passing through the locks at both ends of the canal.

Vessels of 14,000 grt and less are limited to a speed of 8 knots. Vessels over 14,000 grt or 8.5m draft are limited to a speed of 6.5 knots.

Kilometer markers, standing on the banks of the canal, begin with zero (00) at the entrance of Brunsbuttel.

The distance in miles saved by using the canal in preference to navigating around Skagen and through Store Baelt or through The Sound to ports in the Baltic is, as follows:

1. From Hamburg—458 miles via Store Baelt and 356 miles via The Sound.
2. From Bremerhaven—372 miles via Store Baelt and 270 miles via The Sound.
3. From Emden—337 miles via Store Baelt and 235 miles via The Sound.
4. From Rotterdam—309 miles via Store Baelt and 207 miles via The Sound.
5. From Antwerp—314 miles via Store Baelt and 212 miles via The Sound.
6. From Dover—302 miles via Store Baelt and 200 miles via The Sound.
7. From London—293 miles via Store Baelt and 191 miles via The Sound.
8. From Newcastle—191 miles via Store Baelt and 89 miles via The Sound.
9. From Leith—147 miles via Store Baelt and 45 miles via The Sound.

Pilotage.—Pilotage in the canal is compulsory for the following vessels:

1. Tankers over 60m in length, or 10m beam, or 3.1m draft carrying gas/chemicals/petroleum/petroleum products in bulk, or unloaded tankers, if not cleaned, degassed, or completely inerted after carrying petroleum/petroleum products with a flashpoint below 35 C.
2. Other vessels or composite units over 45m in length, 9.5m beam, and 3.1m draft or 55m in length, 8.5m beam, and 3.1m draft.
3. Tows over 55m in length, 10m beam, or 3.1m draft.

Vessels bound for the Nord Ostee Kanal entering from the River Elbe should send a request for pilots at least 2 hours before reaching the entrance, or immediately upon departure from nearby ports or berths if the voyage is less than 2 hours. Pilots board in the river close SW of the entrance to the locks.

Vessels over 100m in length, 15.5m beam, and 6.1m draft or 115m in length, 14m beam, and 6.1m draft must embark a certified helmsman for the canal transit. For vessels carrying certain dangerous goods, the summer draft applies, if this is larger than the actual draft. Vessels over 100m in length with a beam of 19m or more, or over 120m in length with a beam of 17m or more, or with a draft over 7m must employ two helmsmen. Requests for helmsmen should be sent to the Canal Helmsman Service at least 2 hours in advance through Kiel Canal Pilot on VHF channel 9 or VTS Center Kiel Canal on VHF channel 13. Requests may also be made 2 hours in advance through Holtenau Pilot on VHF channel 12 or through Kiel Pilot on VHF channel 14.

Regulations.—See Regulations-Traffic Control (paragraph 9.3) for details of the VTS system operating in the River Elbe.

A Vessel Traffic Service (VTS) system, known as VTS Kiel Canal West, has been established in the canal and its approaches.

The requirements for VTS Kiel Canal East/Kieler Forde are described in Pub. 194, Sailing Directions (Enroute) Baltic Sea (Southern Part) (Sector 3).

Participation in VTS Kiel Canal West is mandatory for all vessels, including pushed or towed composite units. Yachts less than 15m in length are excluded.

Vessels entering the VTS area of VTS Kiel Canal West must maintain a continuous listening watch on the appropriate VHF channels, as follows:

1. Brunsbuttel Locks approach and outer harbors (inbound only)—Kiel Canal Station 1—VHF channel 13.
2. Brunsbuttel Locks approach and outer harbors (outbound only)—Brunsbuttel Elbe Traffic—VHF channel 68.

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3. Brunsbuttel Locks—Kiel Canal Station 1—VHF channel 13.
4. Canal area from Brunsbuttel to Breiholz—Keil Canal Station 2—VHF channel 2.

A Sailing Plan (SP) must be sent, as follows:

1. In the locks, using the form available in the locks.
2. Before leaving a harbor or berth within the VTS area of Kiel Canal West to VTS Center Kiel Canal 2 on VHF channel 2.

A Deviation Report (DR) must be sent in case of amendments to the SP (e.g., when interrupting or commencing canal transit without instruction by the VTS Center) to VTS Center Kiel Canal 2 on VHF channel 2.

An Incident Report (IR) must be sent as necessary to VTS Center Kiel Canal 2 on VHF channel 2.

The format for the SP and the DR can be found under Regulations-Traffic Control (Approach Routes to the German Bight) in paragraph 8.5.

Information relevant to the safe passage of vessels through the VTS area is broadcast as follows and on demand:

1. VTS Center Kiel Canal 2—every H+15 and H+45 on VHF channel 2, in German (on request, in English).
2. VTS Center Kiel Canal 3—every H+20 and H+50 on VHF channel 3, in German (on request, in English).
3. VTS Center Kiel Traffic—during severe icing in Kieler Forde, according to the situation, on VHF channel 22.

These broadcasts include general fairway and traffic situations; local storm warnings and weather messages; visibility and ice reports; casualties; and dredging operations.

Signals.—For the purposes of the Canal Traffic Regulation, vessels transiting are considered to belong to one of six traffic groups, depending on their size and potential hazard. Vessels must display the appropriate lights and shapes for their group. The canal pilots will explain the detailed regulations and the signals, flags, or lights required to be shown.

Entry into the approach area is controlled by light signals displayed from a mast on the lock island separating the two locks.

Entry into the canal is controlled by light signals displayed at the inner and outer ends of the central wall of each pair of locks.

Signs are installed at locations in the canal displaying the mandatory minimum clearance (in meters) to be observed when passing them.

Caution.—Ferries cross the canal at several points. Some are chain ferries and some are free navigating ferries. At night, ferries display an isophase yellow light at the masthead and on each side of their bow and stern.

Several submarine pipelines and cables cross the canal and may best be seen on the chart.

9.8 There are numerous small wharves and loading places situated along the length of the canal. Several locations, usually at the widest places of the canal, are designated as passing sites or sidings. Some of them are at curves in the channel and most of them are equipped with dolphins for vessels desiring to moor alongside. These passing sites, situated about 2.5 to 7 miles apart, are about 600 to 1,400m long and have beds about 135 to 165m wide. Four of these sites are equipped with turning spaces which have bottom diameters of about 300m. The traffic control stations at Brunsbuttel and Holtenau issue the necessary instructions for vessels using these passing sites.

The Gieselau Kanal branches from the Nord Ostsee Kanal abreast Oldenbuttel (54˚10'N., 9˚27'E.) and extends N for 1.5 miles to the Eider River. It can be entered by vessels up to 65m in length and 9m beam. A lock, situated 0.7 mile N of the entrance, can handle vessels with drafts up to 2.7m.

The canal between Rendsburg and Holtenau, a distance of 17 miles, has two fairly sharp curves. One is situated in the vicinity of Levensau Wharf and the other at Knoop, between Km 90 and Km 95. These curves have a radius of cur-vature of about 1,800 and 1,870m, respectively.

Rader Island, small in extent, lies on the NW side of the canal between Km 67 and Km 70. A small loading pier is situated on the SE side of this island.

The Achterwehrer Schiffahrtskanal (54˚20'N., 9˚58'E.) branches S from the Nord Ostsee Kanal, close E of Km 85. It runs through a lock at Stohbruck to the cargo berths at Flemhude, 1 mile S, and at Achterwehr, 2 miles S. This canal is navigable only during daytime by vessels up to 35m in length, 7.5m beam, and 2m draft. A power cable, with a vertical clearance of 21m, spans the canal in two locations.

At Kiel Holtenau, there are two sets of double locks providing access to Kieler Forde. The larger locks have a usable length of 310m and usable width of 40m. An inner harbor here is situated within the canal and provides oil and bunkering berths with depths up to 11m alongside.

9.9 **Rendsburg** (54˚18'N., 9˚41'E.) (World Port Index No. 30730), a city of moderate size, stands on the N bank of the Nord Ostsee Kanal near Km 63. Because of its location in the heart of Schleswig Holstein, the city is an important commercial center. Several industrial plants and a number of shipyards are situated here.

Kreishafen, on the N side of the canal, has a quay, 750m long, with depths of 7 to 9.5m alongside. Vessels up to 165m in length can be accommodated alongside.

The Obereider branches from the canal abreast of Audorfer, close N of Km 65. It extends W for 1.7 miles and is entered through The Enge, a narrow passage. The entire channel has a depth of 4.5m and forms part of the port of Rendsburg. An overhead power cable, with a vertical clearance of 38m, spans the entrance to this channel. There are several private quays, with depths of 4 to 7.7m alongside, and vessels up to 125m in length can be handled. In addition, there are several dry docks at the shipyards, the largest being 193.7m long. Vessels up to 30,000 dwt, 29.5m beam, and 6.4m draft can be accommodated for repairs.

The River Elbe (continued)

9.10 The River Elbe, from Brunsbuttel to Hamburg, follows a winding course between several shoals, flats, and islands. Secondary channels lead between the larger islands and drying sands and the river bank. Both sides of the river are heavily populated and there are numerous landing places, small harbor basins, and marinas. Dikes protect the lowlands on both sides of the river and groins and stone embankments protect the banks from the strong currents in the river.

A number of tributaries, which lead to small wharves mostly used by coasters, discharge into the River Elbe. The most important are Die Stor, which leads to Wewelsfleth and Itzehoe; Die Krukau, which leads to Elmshorn; Die Pinnau, which leads to Utersen; Die Schwinge, which leads to Stade; and Die Luhe, which leads to Grunendeich.

A conspicuous nuclear power station stands on the E bank of the river at Brokdorf (53˚51'N., 9˚20'E.), about 7 miles above Brunsbuttel.

Die Stor (53˚49'N., 9˚24'E.) flows into the River Elbe about 2 miles SE of Brokdorf. The depths in this river are controlled by a flood barrage, situated close within the entrance, which is closed when the water level rises to 1m above MHW. The barrage has two openings, each with a navigable width of 22m, which are spanned by a bascule bridge. The river has a depth of 5.5m as far as Wewelsfleth, 1 mile above the barrage, where there is a shipyard and two dry docks. The largest dry dock can handle vessels up to 18,000 dwt, 132m in length, 22m beam, and 5m draft.

Itzehoe, located 14 miles above the barrage, provides 450m of quayage along the N bank of the river. A depth of 5m is maintained at HW as far as this harbor and vessels up to 82m in length, 12m beam, and 3.8m draft can be accommodated.

To the S of the entrance to the Stor, 3 miles above Brokdorf, the main fairway winds SSE and leads between the drying bank of Brammerbank, on the W side of the river, and the island of Rhinplatte, on the E side.

Rhinplatte (53˚47'N., 9˚24'E.), which fronts the small port of Gluckstadtin, is narrow, long, and very low. Most of the island is foul with weeds and its central part is only just visible at HW. Lights are shown at the N and S extremities of the island.

9.11 Gluckstadt (53˚47'N., 9˚25'E.) (World Port Index No. 30760) stands on the E side of the river, 11 miles above Brundsbuttel. The town is fronted by a small harbor consisting of an outer tidal basin and an inner wet basin. A church and a water tower stand in the town and are prominent.

Tides—Currents.—Off the entrance, the tide rises 2.7m at springs and 2.4m at neaps.

Depths—Limitations.—The harbor can be approached through Gluckstadt Nebenelbe, a channel leading E of Rhinplatte Island. This buoyed channel can be entered at the N or S ends, which have least depths of about 3.7m and 3m, respectively.

The outer harbor basin, which is entered between two moles, is 90m wide. It provides 460m of berthage on the N side and 200m of berthage on the S side, with a projected depth of 5.8m at HW. The inner wet dock basin is accessible only at HW through a gate passage, 12.8m wide. It is 600m long, 55m wide, and has depths of 3 to 5m. The harbor is used by fishing vessels, ferries, coasters, and yachts. Vessels up to 5,000 dwt, 140m in length, and 5.2m draft can be handled.

Caution.—The harbor basins and approach channel are subject to heavy silting.

9.12 The river channel between Gluckstadt and Butzfleth, 9 miles upriver, narrows and the main fairway passes between Schwarztonnen Sand (53˚43'N., 9˚27'E.), on the W side, and Pagensand (53˚42'N., 9˚31'E.), on the E side. Pagensander Nebenelbe, a shallow and narrow channel, passes between Pagensand and the mainland to the E. It is marked by buoys and provides access to the Kruckau and Pinnau rivers.

The Kruckau River flows into the NE end of Pagensander Nebenelbe and is navigable by small craft as far as Elmshorn, 5 miles above its mouth.

The Pinnau River flows into the SE end of Pagensander Nebenelbe and is navigable by small craft as far as Utersen, 5 miles above the mouth, and Pinneberg, 10 miles above the mouth.

The Schwinge River flows into the W side of the Elbe at Stadersand (53˚38'N., 9˚32'E.), 2 miles above the S end of Pagensand, and is used by coasters. It has projected depths at HW of 5.5m at Stadersand and 3.3m at Stade, a town located 2.5 miles upstream. At Stadersand, the N side of the river provides 700m of quayage. There is a quay, 150m long, located along the W bank at Stade. A flood barrage, with a navigable width of 16m, is situated close above Stadersand. Above the barrage the river is spanned by several bascule bridges and a power cable, with a vertical clearance of 21m. Vessels up to 100m in length and 5m draft can be handled at Stadersand, but the river is subject to heavy silting and is not regularly dredged.

9.13 Butzfleth Terminal (53˚39'N., 9˚31'E.) is situated on the W side of the Elbe, 1.3 miles SW of the S extremity of Pagensand. It consists of a T-head jetty, about 500m long, connected to the shore by a road bridge. The outer berths have a dredged depth of 14.6m alongside and the inner berths have depths of 7 to 10m alongside. There are facilities for bulk, chemical, and gas vessels. Vessels up to 270m in length and 14m draft can be handled.

Stadersand Terminal (53˚38'N., 9˚32'E.) is situated on the W side of the Elbe, close N of the mouth of the Schwinge River, and consists of a tanker jetty, with a depth of 10m alongside. It is reported (2001) that this terminal is no longer in use.

A prominent nuclear power station (Stade) is situated about 0.5 mile S of the mouth of the Schwinge River.

Anchorage.—Freiburg Reede (53˚51'N., 9˚20'E.), with depths up to 13m, lies on the W side of the fairway, opposite Brokdorf, and is used mostly by oil and chemical tankers. This anchorage provides shelter even in severe storms, but is located close SE of a cable area.

Krautsand Reede (53˚47'N., 9˚23'E.), which provides good anchorage, lies on the W side of the fairway, opposite Rhinplatte Island. The N part of this roadstead, which is known as Wischafen Reede, is generally reserved for tankers and chemical vessels.

Grauerort Reede (53˚40'N., 9˚30'E.), which provides anchorage for gas and chemical tankers, lies on the W side of the main fairway, 1.4 miles below Butzfleth Terminal.

Twielenfleth Reede (53˚37'N., 9˚33'E.), an anchorage area, lies on the S side of the main fairway, about 1 mile above the mouth of the Schwinge River.

The above anchorage areas are marked by buoys and their limits may best be seen on the chart.

9.14 The River Elbe continues for 9 miles above Stadersand to the outer limit of the port of Hamburg at Tinsdal. From Stadersand to the entrance of the Luhe River (53˚34'N., 9˚38'E.), the main channel extends SE for 5 miles and passes between the island of Luhesand (53˚36'N., 9˚36'E.), on the SW

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side, and an extensive shallow flat fronting the shore, on the NE side.

Several conspicuous masts, each about 200m high, stand in the vicinity of the island of Luhesand and support overhead cables which span the main river fairway. The cables have a vertical clearance of 71.5m and give strong radar echoes. The aluminum spheres suspended at intervals along these cables generally cause additional smaller echoes on close approach.

From the mouth of the Luhe to Tinsdal (53˚34'N., 9˚44'E.), the main channel extends E and passes close to the N bank of the river. Numerous groins extend from both banks of the river and extensive training walls line the S side of the channel.

Hamburger Jachhafen, an extensive marina is situated on the N bank of the Elbe at Wedel (53˚34'N., 9˚41'E.), about 1.5 miles E of the mouth of the Luhe River. A prominent radar mast, 55m high, stands at the SW side of this marina.

At Willkomm Hoft, situated about 0.8 mile E of the marina, arriving and departing ocean-going vessels are generally greeted during daylight hours by the raising of their national flag.

Wedel power station, with two conspicuous chimneys, stands about 1.7 miles E of the marina and is fronted by a coal quay. The quay is 320m long and has a depth of 11.7m alongside.

Hahnofer Nebenelbe (53˚33'N., 9˚44'E.), a secondary channel, branches SE from the main fairway, 0.7 mile SW of Wedel marina. This shallow channel leads S of the islands of Hanskalbsand, Nessand, and Schweinsand and connects with Muhlenberger Loch. A radar station stands on the N side of Nessand.

Muhlenberger Loch (53˚33'N., 9˚48'E.), a small bight, indents the S side of the river and mostly dries. A channel leads S through this bight from the main river fairway to the mouth of the Die Este (53˚32'N., 9˚47'E.).

Die Este, a narrow and tortuous river, is navigable by coasters as far as Buxtehude, 7 miles above the entrance. An outer flood barrage is situated at the river mouth. It has a navigable width of 22m and is spanned by a bascule bridge. An inner flood barrage, with a navigable width of 13.5m, is situated 0.6 mile above the mouth. The river has depths of 4.5m at the mouth and 3.3m as far as Buxtehude.

A shipyard and repair facility, with a number of floating docks, is situated close above the outer flood barrage. The largest dock can handle vessels up to 160m in length, 22m beam, and 6m draft.

Tinsdal (53˚34'N., 9˚44'E.), the site of an oil refinery, is located close E of Wedel power station and forms the westernmost limit of the port of Hamburg.

Blankenese (53˚34'N., 9˚49'E.), a popular resort, stands on the N bank of the Elbe, 2.5 miles E of Tinsdal, and is fronted by a ferry landing stage and two marinas.

Hamburg (53˚33'N., 9˚56'E.)

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9.15 The port of Hamburg, the largest in Germany, is situated 78 miles above the mouth of the Elbe. It serves an extensive industrial area, handles all types of cargo, and is connected to the vast inland waterway system.

Hamburg

Tides—Currents.—In the Norder Elbe at St. Pauli, the tide rises 3.6m at springs and 3.2m at neaps. At Harburg, in the Suder Elbe, the tide rises about 0.1m greater. The tides generally affect the water level as far as 19 miles above the bridges on the Norder Elbe.

At Hamburg, the flood current reaches its maximum rate within 30 minutes and maintains this rate for about 3 hours. The ebb current, acting in a similar manner, attains its maximum rate after about 1 hour and maintains this rate for about 5 hours 30 minutes. The maximum rates under normal conditions is 2 knots in both directions.

Weak and variable local currents may be encountered in some of the dock basins.

Ice.—Even during severe winters, ice is kept moving by the heavy shipping traffic so that the harbor is always kept open. It may cause some difficulties in the slightly frequented basins and channels.

The earliest ice appears about the middle of December, although it has been observed as early as the first week of November. Ice may disappear as early as the last day of January or remain as late as the beginning of March. During severe winters, it has still been observed as late as the latter part of March.

Depths—Limitations.—The port is comprised of the combined areas of Hamburg, Altona, and Harburg-Wilhelmsburg harbors and consists of 35 main basins for ocean-going vessels, with depths up to 17m alongside, and 21 basins for inland waterway craft. These basins provide about 23 miles of berthage alongside quays and 13 miles of berthage alongside dolphins. The harbor area extends for 14 miles in an E/W direction and 5 miles in a N/S direction. It can accommodate over 430 ocean-going vessels at the same time.

Hamburg

The River Elbe between Tinsdal and Altona (53˚33'N., 9˚56'E.) is known as the Unterelbe. At Altona, the river divides into two branches. The Norder Elbe, the N branch, leads E for about 3.5 miles to the center of Hamburg where it is spanned by two fixed bridges. The Suder Elbe, the S branch, leads S and then E, passing between the districts of Harburg and Wilhelmsburg. The two branches reunite at Buntshaus, about 5 miles above the fixed bridges on the Norder Elbe, thereby forming an island. Above Buntshaus, the river is known as the Oberelbe. An extensive complex of dock basins is situated on the island formed between these two branches.

The dock basins are grouped into several well-defined harbor areas. The principal basins, including all those for ocean-going vessels, are tidal and easily accessible from the Unterelbe and the two branches of the river. The basins for the inland waterway traffic are either accessible from the river or are interconnected by a system of gate locks and canals.

Reiherstieg (53˚29'N., 9˚59'E.), a canal, passes through the complex of dock basins situated along the above-mentioned island. It has depths of 4 to 6m and provides access from the Norder Elbe to the Suder Elbe. Both branches of the Rtver Elbe are navigable by ocean-going vessels.

Three pricipal bridges are situated in the port area. Kohlbrand Hochbrucke (53˚31.3'N., 9˚56.4.'E.), a fixed road bridge, spans the Suderelbe and has a vertical clearance of 51m. Kattwyk Hubbrucke (53˚29.7'N., 9˚57.2'E.), a lift bridge, spans the Suderelbe and has a navigable width of 100m, with a vertical clearance of 51m. Rethe Hubbrucke (53˚30.3'N., 9˚58.1'E.), a lift bridge, spans the W entrance to Reiherstieg and has a navigable width of 42m, with a vertical clearance of 51m.

Several overhead cables span the channels and basins within the port area and may best be seen on the chart. Generally, their vertical clearances are greater than the above bridges and are not controlling factors.

With the exception of an inner basin at Harburg, all of the basins are tidal and open to the river, thereby permitting entry and exit at all times. Extensive cargo facilities are available including floating cranes up to 400 tons capacity, floating grain elevators, and floating coal elevators. Tanker, ro-ro, chemical, bulk, container, general cargo, passenger, LASH, reefer, ferry, and fishing vessels can be handled. In addition, the harbor provides facilities for repair and shipbuilding services; several dry docks and floating docks are situated within the port. The largest dry dock is 351m long and 59m wide. It can handle vessels up to 320,000 dwt, 350m in length, 54m beam, and 9.5m draft.

The main river fairway has a projected dredged depth of 14.4m as far as the port. Inbound vessels transiting the river at HW are generally limited to a maximum length of 360m or a maximum fresh water draft of 15.1m. Outbound vessels are limited to a maximum fresh water draft of 13.7m.

See Depths-Limitations in the River Elbe, in paragraph 9.3, for maximum size limits pertaining to tide-dependent vessels.

Generally, the river passage takes between 5 hours and 7 hours 30 minutes, depending on the size of vessel. Vessels over 10m draft should arrange to arrive at Seemannshoft (53˚32'N., 9˚53'E.) about 1 hour prior to HW at the port.

Deep-draft vessels normally begin discharging immediately on arrival so as to remain afloat through the following LW period. However, the bottom throughout the port consists of soft mud and sand so significant damage is unlikely due to touching the ground.

Vessels with fresh water drafts up to 12.8m can reach the port independent of the tide. Vessels up to 100,000 dwt, fully laden, and 250,000 dwt, partly laden, can be accommodated within the port.

See Regulations (paragraph 9.3) for limits pertaining to Extraordinary Large Vessels.

The principal groups of dock basins and quays are identified, as follows:

1. The Hamburg-Finkenwerder area is situated at the W end of the port, S of the main fairway. It includes the following main facilities:
   a. Kohlfleethafen, which has a depth of 12m and provides oil berths at a central jetty.
   b. Kohlfleet, which has depths of 5 to 12m and is used by general cargo and fishing vessels.
   c. Dradenauhafen, which has depths of 5.4 to 14.4m and provides ore and timber berths.
   d. Finkenwerder Vorhafen, which has depths of 9 to 11m and provides ro-ro berths.
   e. A riverside waiting berth, situated on the S side of the main fairway, is formed by dolphins and has a dredged depth of 15.5m.
2. The Hamburg-Waltershof area is situated W of the Suder Elbe and S of the main fairway. It includes the following main facilities:
   a. Petroleumhafen, which has depths up to 11.9m and provides oil berths.
   b. Waltershofer Hafen, which has depths of 9.8 to 16.5m and provides extensive container berths.
   c. Griesenwerder Hafen, which has depths up to 10m and provides general cargo and ro-ro berths.
   d. Athabaskai, a riverside quay, which provides ro-ro ferry and container berths and has a depth of 13.4m alongside.

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3. The Hamburg-Neuhof-Kattwiek-Hoheschaar area is situated adjacent to the N part of the Suder Elbe. It includes the following main facilities:
   a. Hansaport (Sanauhafen), which has depths up to 17m and provides ore and bulk berths.
   b. Neuhoferhafen, which has depths up to 12.5m and provides oil berths.
   c. Rethe (Reiherstieghafen), which has depths of 10 to 13.5m and provides general cargo, oil, grain, and bulk berths.
   d. Blumensandhafen, which has a depth of 13m and provides oil berths.
   e. Kattwykhafen, which has depths of 12 to 13.7m and provides oil and auto-carrier berths.
4. The Hamburg-Harburg area is situated at the S side of the inner part of the Suder Elbe. It includes the following main facilities:
   a. Seehafen I, which has depths of 7.4 to 9m and provides general cargo and grain berths.
   b. Seehafen II, which has depths of 7.4 to 11m and provides coal berths.
   c. Seehafen III, which has depths of 9 to 10.4m and provides liquid bulk berths.
   d. Seehafen IV, which has depths of 6.8 to 8.4m and provides oil berths.
5. The Hamburg-Altona area is situated on the N side of the Norder Elbe, at the W end. It includes the following main facilities:
   a. Fischereihafen, which has depths of 3.6 to 6.4m and provides berths for fishing vessels.
   b. Engelhardtkai, a riverside quay, which has a depth of 8m and provides ferry and cruise passenger berths.
6. The Hamburg-Kuhwerder-Ross-Steinwerder area is situated on the S side of the Norder Elbe, at the W end. It includes the following main facilities:
   a. Kohlenschiffhafen, which has depths of up to 7m at the dolphins and provides coal and bulk berths.
   b. Vorhafen, which has depths of 9.4 to 12.1m and provides container berths.
   c. Vulkanhafen, which has depths of 7.6 to 9.6m and provides shipbuilding berths.
   d. Rosshafen, which has depths of 7 to 10.1m and provides general cargo and fitting-out berths.
   e. Ellerholzhafen, which has depths up to 10.6m and provides general cargo and container berths.
   f. Oderhafen, which has depths of 2.4 to 11.6m and provides general cargo and ro-ro berths.
   g. Kaiser Wilhelm Hafen, which has depths of 9.4 to 12.1m and provides general cargo and container berths.
   h. Kuhwerder Hafen, which has depths of 8.4 to 9.6m and provides reefer and grain berths.
   i. Werfthafen, which has depths of 6.6 to 12.6m and is a shipyard basin.
7. The Hamburg-Kleiner-Grasbrook area is situated on the S side of the Norder Elbe, at the E end. It includes the following main facilities:
   a. Segelschiffhafen, which has depths of 6.9 to 8.3m and provides ro-ro and fruit berths.
   b. Hansahafen, which has depths of 6.3 to 11.6m and provides general cargo, fruit, and vehicle-carrier berths.
   c. Indiahafen, which has depths of 8.4 to 9.6m and provides general cargo berths.
   d. Sudwesthafen, which has depths of 3.2 to 8.4m and provides general cargo berths.
8. The Hamburg-Grosser-Grasbrook area is situated on the N side of the Norder Elbe, at the E end. It includes the following main facilities:
   a. Baakenhafen, which has depths of 5.3 to 12m and provides general cargo and paper product berths.
   b. Sandtorhafen, which has depths up to 7.5m and provides general cargo and ro-ro berths.
   c. Grasbrookhafen, which has depths up to 4.8m and provides general cargo and ro-ro berths.
   d. Kirchenpauerkai, a riverside quay, which has depths up to 12m and provides container berths.
   e. St. Pauli Landing Stage, a riverside quay, which has a depth of 8.1m and provides ro-ro ferry and passenger berths.
   f. Uberseebrucke, a riverside quay, which has a depth of 9.6m and is used by large passenger ships.

Signals.—Water level and tidal signals are shown from windows in the prominent radar station building at Seemannshoft (53˚32'N., 9˚53'E.). Letters "E" or "F" denote the ebb or the flood and two black digits indicate the height of tide in meters and decimeters above chart datum. Red digits indicate a height below chart datum.

A clock tower stands close N of the E end of St. Pauli Landing Stage Quay. Water level and tidal signals generally similar to those shown at Seemannshoft are displayed from it.

Caution.—Tunnels pass under the River Elbe in the vicinity of St. Pauli (53˚32.6'N., 9˚58.0'E.) and Maakenwerder Hoft (53˚32.4'N., 9˚55.5'E.). Vessels may pass over these tunnels only at slow speed and when there is sufficient water.

Passenger ferries operate between landing stages throughout the port area. They are especially concentrated within the Unterelbe in the vicinity of St. Pauli (53˚33'N., 9˚58'E.).

Helgoland

9.16 Helgoland (54˚11'N., 7˚53'E.), a resort island, is an important landmark in the approach to the River Jade, the River Weser, the River Elbe, and the River Eider. It lies about 25 miles W of the coast and consists of a mass of red limestone, which rises steeply from the sea to a height of 60m. The E part of the island consists of a low foreland extending from cliffs. Dune, a low and sandy island, lies 0.5 mile E of Helgoland and is the location of a small airfield. A prominent tower stands near the center of this island.

Small harbor basins, mostly used by small craft and local ferries, are situated on the SE and NE sides of Helgoland and also at the W end of Dune. However, this latter harbor is now closed to public traffic.

A main light is shown from a conspicuous square radar tower, 34m high, standing on the W cliffs of Helgoland and a prominent signal station is situated close SE of it. Conspicuous radio masts stand close SSE and 0.4 mile NW of the light. A church, with a prominent spire, and the conspicuous chimney of a power station are situated close NE and 0.2 mile NNE, respectively, of the light.

Helgoland Light

Lighted range beacons are situated near the center of the S coast of Dune. They indicate the narrow approach channel which leads between the shoals and reefs into Binnen Reede Sud and the entrances to the harbor basins on Helgoland.

Langa Anna, a conspicuous detached stack, rises close W of the NW extremity of Helgoland.

Numerous reefs and wrecks, which may best be seen on the chart, front all the sides of the islands. Selle Brunn is the outer end of a chain of reefs which extends up to about 3 miles NW from Dune. Selle Brunn Knoll, with a depth of 6.7m, lies about 0.5 mile farther NW. Repulse Grund, with a least depth of 4.9m, lies about 1.3 miles NW of Helgoland and is the outermost danger off this part of the island.

9.17 **Steingrund** (54˚14'N., 8˚03'E.), a rocky shoal, lies about 5.5 miles NE of Dune and has a least depth of 8.7m. This detached shoal, which is foul with explosives, is marked by a lighted buoy moored about 1 mile E of it.

Tides—Currents.—The tides at Helgoland rise about 2.7m at springs and 2.3m at neaps.

An ESE current starts to set past Helgoland at about 5 hours 30 minutes before local HW. It attains a maximum rate of 1 to 1.3 knots about 2 hours before HW. A WNW current starts to set past Helgoland at about 1 hour after local HW. It attains a maximum rate of 1 to 1.3 knots about 4 hours after HW.

As the islands are approached, their effect on the tidal currents becomes noticeable, and up to about 4 miles from the islands, though the tidal currents set more or less the same as offshore, they are subject to considerable, but uncertain, changes.

Ice.—Ice may be encountered in the vicinity of Helgoland between the early part of January and the early part of March. It is not usually a hindrance to navigation.

Caution.—High speed ferries operate in the vicinity of Helgoland.

Extensive lobster beds and nature protection areas are located near Helgoland and Dune. Most of the shore of the two islands is fronted by restricted areas, which are marked by buoys and may best be seen on the chart.

Ammunition dumping ground areas, which may best be seen on the chart, lie about 2.5 miles S of Helgoland and 1 mile N of Dune.

The approaches to the small harbors are encumbered with extensive shoals and reefs, some marked by buoys, and local knowledge is required. After gales, the positions of the buoys, especially in the outer approaches, cannot be relied upon.

The River Elbe to Listertief

9.18 From the main entrance to the River Elbe, the coast extends 65 miles N to Listertief (55˚04'N., 8˚24'E.). The mainand shore consists largely of low-lying marsh land protected by dikes, and in a few places, sand dunes. Amrum (54˚38'N., 8˚21'E.) and Sylt (55˚44'N., 8˚18'E.) are the outermost islands fronting this section of the coast.

The German/Danish boundary extends ESE through Listertief, N of Sylt, SE through Hojer Dyb, and E of Sylt. It then extends S and E across the shoals and drying flats towards the shore.

Busum (55˚08'N., 8˚52'E.), Tonning (55˚19'N., 8˚57'E.), and Husum (55˚29'N., 9˚03'E.) are the most important towns along this section of the coast.

Ice.—The time of onset of ice and the duration are extremely varied. The direction of the wind has a considerable influence on ice conditions along the coast. Continuous W winds free the approaches to the channels temporarily, but force the loose ice into the inner parts of the channels. Continuous E winds cause considerable ice flows. Ice forms rapidly over the flats at LW and then, with a rising tide, the winds blow it into the channels. It has been reported that, during severe winters, ice can stop the coastal traffic.

Tides—Currents.—At Amrum Haven (54˚38'N., 8˚21'E.), the tides rise about 2.9m at springs and 2.6m at neaps.

Generally, the currents from the North Sea set in SE and E directions, with a rising tide at Helgoland and in the opposite directions with a falling tide.

At a position about 16 miles WSW of Amrum, the currents set chiefly SE and NW. However, the current tends to turn counterclockwise, more slowly when it is strong and more rapidly when it is approaching the turn of the tide.

During spring tides, the incoming current sets in a SW direction at a rate of 0.3 knot about 5 hours 30 minutes before HW at Helgoland. It attains a maximum rate of 1.1 knots, setting in a SE direction, about 2 hours 30 minutes before HW. Shortly after HW, the outgoing current sets in a NE direction at a rate of 0.3 knot. It attains a maximum rate of 1 knot, setting in a NW direction, about 3 hours 30 minutes after HW at Helgoland.

During neap tides, the incoming current sets in a SW direction at a rate of less than 0.3 knot about 5 hours 30 minutes before HW at Helgoland. It attains a maximum rate of 0.8 knot, setting in an ESE direction, about 3 hours before HW. About 30 minutes after HW, the outgoing current sets in a NE direction at a rate of 0.3 knot. It attains a maximum rate of 0.8 knot, setting in a NW direction, about 4 hours after HW.

The water level along this part of the coast is influenced considerably by the direction and force of the wind. Winds from

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the W usually cause higher water levels and those from the E usually cause lower water levels than those predicted in the tide tables. In exceptional cases, the water level has been reduced by as much as 2.5 to 3.5m.

Caution.—Three disused ammunition dumping ground areas, the limits of which are shown on the chart, lie off Sylt. They lie centered 5 miles WNW of the N end of Sylt, 15 miles W of the N end of Sylt, and 3.5 miles WNW of the S end of Sylt.

A prohibited area, the limits of which are shown on the chart, lies centered about 18 miles WSW of the N end of Sylt and is marked by a lighted buoy.

A submarine exercise area, the limits of which are marked on the chart, lies centered 21 miles NW of Helgoland.

Several submarine cables extend seaward from this stretch of coast and may be best seen on the chart.

Numerous wrecks, some dangerous, lie off this stretch of coast and may be best seen on the chart; most off-lying dangerous wrecks are marked by lighted buoys.

Many of the buoys, especially lighted buoys, moored in the open sea along this part of the coast are liable to be out of position as a consequence of the action of the sea. Station buoys, painted in a similar fashion, have therefore been moored near them.

9.19 Off-lying dangers—Amrum Bank (54˚38'N., 8˚00'E.), marked by lighted buoys, forms the outermost danger in this area and consists of two detached patches which lie with their outer edges 8 to 14 miles W of the island of Amrum. The northernmost patch has a least depth of 9m; the southernmost patch, lying 10.5 miles W of Amrum, has a least depth of 5m. A channel, about 1 mile wide, leads between these two shoal patches and has a least depth of 10m. Numerous wrecks and foul patches lie within 5 miles of Amrum Bank, and several wrecks and obstruction areas lie within 5 miles W of the island of Sylt.

Drying flats and shoals extend seaward from this part of the coast and numerous narrow and winding, though sometimes deep, channels lead between them. The bars that front these channels and the banks on either side of them vary considerably under the influence of wind and storms, especially with strong W winds, so that the depths given on the charts are not always reliable.

For the most part, these channels lead to places of no great importance and traffic is confined to local coasters, fishing boats, and pleasure craft.

9.20 Norder Elbe (54˚03'N., 8˚25'E.), a narrow secondary channel, leads ESE along the N sides of Grosser Vogelsand (54˚01'N., 8˚27'E.) and Gelbsand (53˚59'N., 8˚39'E.) and rounds the E edge of the latter shoal. Norderelbe Lighted Buoy (5˚03'N., 8˚25'E.) is moored about 5.2 miles N of Scharhorn and marks the outer entrance. This channel, which is buoyed, joins Die Elbe about 5 miles NNW of Cuxhaven. It should only be used by vessels with local knowledge and in good weather. Entry should not be attempted during strong W winds as a heavy surf and swell are raised in the fairway.

Neu Fahrwasser (54˚02'N., 8˚40'E.) initially branches ENE from Norder Elbe, 7 miles above the entrance. This shallow channel, which is buoyed, then passes N and E of Mittel Plate and leads SE to Friedrichskoog.

Mittelplate A Platform (54˚02'N., 8˚44'E.), with two lighted dolphins located close E, stands about 5 miles WNW of Friedrichskoog and is prominent from seaward.

Friedrichskoog (54˚00'N., 8˚52'E.), a small drying harbor, is situated about 0.5 mile within the entrance of a narrow inland channel and close E of a flood barrage. It is mostly used by fishing vessels. Vessels up to 25m in length, 8.2m beam, and 2m draft can be accommodated.

Trischen (54˚04'N., 8˚41'E.), a low island, is situated 2 miles NW of the Mittelplate A Platform on the outer end of Marner Plate, an extensive drying flat. A conspicuous tower stands near its center.

Trischendamm (54˚02'N., 8˚49'E.), a causeway, extends about 1.2 miles W from the NW end of the Dieksand Peninsula, 2 miles NNW of Friedrichskoog.

9.21 Suderpiep (54˚06'N., 8˚26'E.), a narrow channel, leads E through the extensive drying flats fronting the coast. It is buoyed and has a least depth of 5m. Suderpiep Lighted Buoy (54˚02'N., 8˚49'E.) is moored about 11 miles NE of Elbe Lighted Buoy and marks the outer entrance, which has no bar. The channel passes S of Tertius Sand (54˚08'N., 8˚40'E.), on which stands a conspicuous beacon mast, and leads 19 miles to Busum.

Norderpiep (54˚11'N., 8˚28'E.), a secondary channel, leads ESE and SE to join Suderpiep. It is entered about 6.5 miles NE of Suderpiep Lighted Buoy and passes N of Tertius Sand. The fairway, which is obstructed by a wide bar, is marked by unlit buoys and has least depths of 3 to 4m. During W gales, the sea breaks on the bar.

Several beacons stand on the sandbanks fronting the coast in this vicinity and provide the only marks visible from seaward. However, they are of no navigational value except in clear weather. Closer in, the landmarks at Busum can be identified. Local knowledge is advised for navigating both Norderpiep and Suderpeip.

Busum (54˚08'N., 8˚52'E.), standing on the N side of Meldorfer Bucht, provides one of the most accessible small ports located along this section of coast. The port, lying 19 miles above the entrance to Suderpiep, consists of an outer harbor, protected by two moles, and an inner harbor, protected by a flood barrage. The tide rises about 3.6m at springs and 3.2m at neaps.

The entrance channel is 21.5m wide and is indicated by a lighted range. The outer harbor, which has two ro-ro berths, is dredged to a depth of 3.7m, but is subject to silting. The flood barrage is closed when the tide reaches 0.3m above MHW. A lock in the barrage enables vessels up to 30m in length to enter the inner harbor while it is closed.

The inner harbor consists of four tidal basins, two of which can be used by commercial vessels. Basin II, 420m long and 50m wide, has a dredged depth of 2.7m. Basin III, 500m long and 80m wide, has a dredged depth of 3.7m. The harbor can handle general cargo, bulk, and ro-ro vessels up to 120m in length, 20m beam, and 6m draft at HW. There are also extensive facilities for fishing boats and pleasure craft. Vessels intending to enter the harbor should send an ETA at least 48 hours in advance and contact the harbormaster on VHF chan-

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nel 11 to ascertain the actual depth conditions. Vessels entering are required to have an underkeel clearance of 0.5m, but they may take the bottom at LW.

A main light is shown from a prominent tower, 22m high, standing at Busum. A conspicuous building, 22 stories high, is situated in the W part of the town and a prominent silo stands near the center of the harbor.

Meldorfer Bucht (54˚04'N., 8˚52'E.) extends between Busum and the Dieksand Peninsula, 5.5 miles S. It is obstructed by extensive drying flats. Most of the shore of this bight is lined by a dyke from which numerous groynes extend as part of a reclamation project. Several shallow channels, used only by pleasure craft and fishing boats, lead through the flats.

Busum Main Light

9.22 **Die Eider** (54˚12'N., 8˚36'E.) discharges into the North Sea through a wide estuary lying S of the Eiderstedt Peninsula. The upper reaches of this river are connected to the Nord Ostsee Kanal.

Most of the estuary is obstructed by extensive shoals and drying flats which extend up to about 8 miles seaward. The main channel leading into the river mouth is subject to constant change and local knowledge is essential. The outer entrance of this channel is obstructed by a bar and marked by Eider Lighted Buoy (54˚15'N., 8˚28'E.). The river fairway, which leads ESE, is marked by lighted buoys and buoys. It provides access to the small harbors of Tonning and Friedrichstadt. The least depth over the bar is 3.1m (2001).

The river is closed 4.5 miles below Tonning by Eiderdamm (54˚16'N., 8˚51'E.). This protective dam, which is 2.5 miles long, incorporates sluice gates and a small lock. Vessels up to 75m in length, 13m beam, and 2.7m draft can be handled in the lock.

Tonning (54˚19'N., 8˚57'E.) (World Port Index No. 30690), a small harbor, is used by coasters and fishing boats. It provides about 900m of quayage with depths of 3 to 3.5m alongside. Vessels up to 60m in length, 10m beam, and 2.7m draft can be accommodated.

Friedrichstadt (54˚23'N., 9˚05'E.) is located at the confluence of the Eider River and the Treen River, about 9 miles above Tonning. It is used by small coasters which also enter via the Nord Ostee Kanal and the Gieselua Kanal. A navigation lock gives access to this small harbor and vessels up to 50m in length, 9m beam, and 2.7m draft can be handled at HW.

9.23 The **Eiderstedt Peninsula** (54˚20'N., 8˚38'E.) extends W for 13 miles from Tonning and is about 8 miles wide. It is low and protected from the sea by dikes and sand dunes.

Saint Peter Light

Saint Peter Light (54˚17'N., 8˚39'E.) is shown from a prominent tower, 18m high, standing on the SW part of the Eiderstedt Peninsula. A conspicuous building is situated in the town of Saint Peter Ording, 1.7 miles NW of the light.

Westerheversand Light (54˚22'N., 8˚38'E.) is shown from a prominent tower, 40m high, standing on the NW part of the Eiderstedt Peninsula.

The S extremity of Sylt (54˚53'N., 8˚20'E.) lies about 27 miles NNW of Westerheversand Light. The intervening area contains Suderoog Sand, Norderoog Sand, Jap Sand, and Amrum, the outermost islands of the Nordfriesische Inseln chain. Shallow channels lead between these islands and provide access to several small coastal harbors. Dangerous shoals and flats extend up to about 7 miles seaward of these islands and numerous wrecks, some stranded, lie in this vicinity. Several resort villages are situated on many of the larger islands.

Amrum (54˚38'N., 8˚21'E.) is 6 miles long and has several sand dunes, about 30m high, standing in its N part. The dunes at the S end of this island are lower and much lighter in color.

A main light (Amrum) is shown from a prominent tower, 41m high, standing in the S part of the island and two conspicuous windmills are situated 0.7 mile and 1 mile N of it.

A prominent church stands at Nebel, 1.2 miles N of Amrum Light. It is reported (1999) that a casino building, standing at a resort in the S part of the island, is conspicuous from seaward.

A light (Norddorf) is shown from a tower, 8m high, standing near the NW end of the island.

For a description of Amrum Bank, see paragraph 9.19.

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Westerheversand Light

Amrum Light

9.24 Pellworm (54˚31'N., 8˚39'E.), small and low, is relatively densely populated. It is surrounded by extensive drying flats. A prominent church tower, in ruins, stands on the W side of this island and a wind generator is situated close S of it. A main light is shown from a prominent tower, 41m high, standing on the S part of the island.

Pellworm Light

Nordstrand (54˚30'N., 8˚55'E.), an island surrounded by extensive drying flats, is connected at its E side to the mainland by a road causeway and a dam.

Fohr (54˚43'N., 8˚30'E.), the second largest of the Nordfriesische Inseln, is low and diked. Several villages stand on this island and a small harbor is situated at Wyk, on its E side.

Langeness (54˚38'N., 8˚32'E.) is connected at its NE end to Oland (54˚41'N., 8˚42'E.), which in turn is connected by a causeway at the N end to the mainland. A main light (Nordmarsch-Langeness) is shown from a prominent tower, 11m high, standing on the W end of this island.

Nordmarsh-Langeness Light

Suderoogsand Light (Refuge Beacon)

Numerous smaller islands and islets lie within the bight extending between the Eiderstedt Peninsula and the S end of Sylt. Most of these islands are served from the mainland by small passenger ferries.

Suderoogsand (54˚26'N., 8˚29'E.), a low island, lies about 7 miles NW of Westerheversand Light. A light is shown from a prominent refuge beacon, 19m high, standing on piles at the SW end of this island.

9.25 Die Hever (54˚23'N., 8˚24'E.) is entered between Suderoogsand and the shoals extending W from the Eiderstedt Peninsula. Suder Hever, Mittel Hever, and Alte Hever are three buoyed channels which lead into the mouth of this river. These channels are separated by shallow banks, some of which dry in parts, and are obstructed by bars. They extend in an E direction and unite as one channel, about 7 miles above the river entrance. Mittel Hever, the main channel, is marked at its seaward end by Hever Lighted Buoy (54˚20'N., 8˚18'E.) and has a depth of 4.6m.

About 11 miles above the mouth, Die Hever divides into two channels. Hever Strom, the S and main channel, continues E to Husum. The depths in the channels are subject to frequent changes and vessels should not enter them without local knowledge.

Husum (54˚29'N., 9˚03'E.) (World Port Index No. 30680) is approached through Hever Strom, the S continuation of Mittel Hever. This small harbor lies in the widened section of Husumer Au, a river outlet, and extends 0.9 mile E above a flood barrage. It is divided into two parts by a bascule railroad bridge. The outer part provides 600m of quayage. The inner part provides 350m of quayage and dries at LW. The controlling depth in the entrance to Husumer Au is 1m. Tides rise about 3.8m at springs and 3.4m neaps. There are facilities for coasters, fishing vessels, and small craft. Vessels up to 145m in length, 21m beam, and 4.1m draft can be accommodated at HW. However, vessels over 70m in length may experience difficulty in maneuvering.

A number of prominent churches, a water tower, and several silos are situated in the vicinity of Husum. Sudfall (54˚28'N., 8˚44'E.) is an islet lying in the outer approaches on which stands a conspicuous house and a radio mast.

9.26 Sylt (54˚53'N., 8˚20'E.), the outermost and largest of the Nordfriesische Inseln, is almost 20 miles long. A peninsula, which extends about 5 miles ESE from the center of this island, is joined to the mainland by Hindenburgdam, a causeway carrying a railroad. A narrow peninsula extends 9 miles S from the center of the island to Hornum Odde, the S extremity, and is dotted with sand dunes, 15 to 30m high.

Hornum (54˚45'N., 8˚18'E.), a resort village, is situated on the E side of Sylt, 1 mile N of Hornum Odde. It is fronted by a small harbor protected by moles. The harbor basin, which is 350m long and 90m wide, can accommodate vessels up to 70m in length and 4m draft. It is approached through Vortrapp Tief, a buoyed channel leading between Amrum and the shoals extending S from Hornum Odde.

A main light is shown from a prominent tower, 34m high, standing at Hornum. A conspicuous radio mast, 193m high, stands about 3 miles of N of the light. A group of other radio masts are situated close NW of this mast.

Rote Kliff, 51m high, forms the highest part of Sylt. It rises near the center of the island and is about 1 mile long.

Kampen Light (54˚57'N., 8˚20'E.) is shown from a prominent tower, 38m high, standing on Rote Kliff and a conspicuous disused light tower is situated about 1.2 miles N of it.

A large white apartment building stands at Westerland, 2.5 miles SSW of Kampen Light, and is conspicuous from seaward. A radio mast and a church tower, both prominent, are situated about 0.3 mile ENE and 0.3 mile ESE, respectively, of this building.

Hornum Light (Sylt)

Kampen Light

The N part of Sylt, known as Listland, consists of numerous sand dunes up to about 30m high. Ellenbogen, an elbow-shaped peninsula, forms the N extremity of the island and is a bird sanctuary. List (55˚01'N., 8˚26'E.), a resort village, stands on the N part of the island and is fronted by a small craft harbor.

List West Light is shown from a tower, 11m high, standing at the NW end of Ellenbogen. List Ost Light is shown from a tower, 13m high, standing on the N side of Ellenbogen, 1.5 miles E of List West Light.

Listertief (55˚04'N., 8˚27'E.), also known as Listerdyb, leads between the N end of Sylt and the island Romo. This channel provides access to an extensive sheltered area of mainly shallow water. It is used by coasters and fishing vessels seeking refuge during bad weather. The seaward entrance is marked by Listertief Lighted Buoy (55˚05'N., 8˚17'E.), which is moored close W of a bar. The buoyed fairway leads E for about 7 miles to a position located adjacent to the E extremity Ellenbogen. There are depths of 4 to 5m over the bar, but greater depths lie in the channel and the roadstead.

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List West Light (Sylt)

List Ost Light (Sylt)

Salz Sand extends up to about 3 miles W of Ellenbogen and forms the S side of this channel. Parts of this shoal dry and its outer edge is nearly always marked by breakers.

Tides rise about 1.8m at springs and 1.7m at neaps in the channel. Vessels can anchor in the roadstead lying off the E end of Ellenbogen, in depths of 11 to 20m. The channel and adjacent banks are subject to frequent change.

Listertief to Hanstholm

9.27 Between Listertief and Blavands Huk, 32 miles NNW, the coast is low and sandy. The shore is fronted by a sandy shoal which extends up to about 10 miles seaward and mostly dries at LW. The low islands of Romo, Mano, and Fano lie on this shoal and consist of numerous sand dunes.

Esbjerg, located 13 miles ESE of Blavands Huk, is the largest Danish port on the W coast of Jylland (Jutland).

Romo (55˚08'N., 8˚31'E.) lies 5 miles offshore and is connected at its E side to the mainland by a causeway. The W side of the island consists of a low and sandy beach which rises inland to sand dunes. The pointed steeple of a church and a beach hotel, both prominent, stand near the center of the island.

Romo Haven, a small harbor, is situated on the SE side of the island and protected by breakwaters. It has a dredged depth of 4.2m and can accommodate vessels up to 90m in length and 4m draft at HW. This harbor is used by fishing vessels, pleasure craft, and passenger ferries.

Romo Flak, a drying bank, extends about 3 miles W from the N end of the island.

Rode Klit Sand (55˚11'N., 8˚10'E.) lies about 13 miles W of Romo and has a least depth of 6.9m. This bank is marked by a lighted buoy moored on its W side.

Fano Bugt (55˚21'N., 8˚10'E.), a bay, indents the coast between Horns Rev (55˚31'N., 7˚45'E.) and Rode Klit Sand.

Mando (55˚17'N., 8˚33'E.), a small island, lies 3.5 miles N of Romo and is connected to the mainland at its E side by a causeway. It appears from seaward as a uniform line of white dunes.

9.28 **Fano** (55˚24'N., 8˚25'E.), lying within Fano Bugt, appears as a line of dunes with beach hotels and villas. Sonderho, a resort village, is situated on the S end of the island and a church and a windmill, both prominent, stand in its vicinity.

A conspicuous church, with a group of wind generators standing 1.2 miles NNW of it, is situated at Nordby, in the NE part of the island. For Norby Havn, see paragraph 9.29.

Knudedyb, a buoyed channel, leads E between the S end of Fano and Mando. It provides access to the inner sheltered waters and is used by small vessels seeking refuge during bad weather. The bar, which is marked by a lighted buoy, has a depth of only 3m over it. The outer part of the channel, inside the bar, has depths of 7 to 14m. Local knowledge is required.

Tides—Currents.—In the outer part of Fano Bugt, the flood current sets SE and the ebb current sets NW. The current changes regularly in calm weather, about every 6 hours and usually counterclockwise, with no period of slack water. These currents attain a maximum rate of 1.5 knots, though the outgoing current may be somewhat stronger than the incoming one. The current maintains a rate of 0.3 knot as it turns.

Strong winds and storms have a considerable effect on these tidal currents. Gales from SE through S to NW usually increase the rate of the NW ebb current, which may attain a rate up to 3 knots, while entirely suppressing the SE flood current. During storms from these directions, the SE current will frequently set for only 3 hours.

Closer to the coast, the flood and ebb currents generally follow the shore. The flood current sets S and flows into the channels and the ebb sets N and out of the channels.

Caution.—Numerous wrecks, some dangerous, lie off this stretch of coast and may best be seen on the chart.

Several submarine cables, which may best be seen on the chart, extend seaward from the vicinity of Fano and the S end of Romo.

A restricted area, which may best be seen on the chart, extends up to about 5 miles W of Romo and 7 miles W of Mando. Anchoring and fishing are prohibited within this area.

An area, within which fishing and anchoring are dangerous due to the residual danger from mines, extends NW from Mando and along the W coast of Fano. This area extends about 1 mile from the shore and may best be seen on the chart.

A firing practice area is situated in the vicinity of the N end of Romo. A flashing light is shown from a control tower when the area is in use.

Esbjerg (55˚28'N., 8˚27'E.)

World Port Index No. 30640

9.29 Esberg, one of the most important ports on Jylland, is protected on the SW side by the island of Fano and on the NW side by the Skallingen Peninsula. The harbor is situated on the mainland, 7 miles above the Gradyb bar.

Winds—Weather.—Depths in the approaches to the port are frequently affected by strong winds. Winds from W and SW raise the water level and those from E tend to lower it. Also, heavy seas may break over the bar with strong W to SW winds.

Ice.—During severe winters, ice may form on the shoals in Gradyb and SE of Esbjerg. At HW, this ice is usually broken loose and carried into the channel by the ebb current, where it may hinder navigation before it disappears or is carried out to sea by NE winds. Usually, navigation is seldom interrupted for any length of time by fixed ice covering the entire channel.

Tides—Currents.—Off the entrance, the tide rises about 1.5m at springs and 1.2m at neaps.

The flood current begins about 5 hours before HW at Helgoland and sets SSE. It attains a maximum rate of 0.3 knot at springs. Between the bar and Torre Bjaelke, a bank on the SW side of Skalling Ende, the flood current sets across the banks on both sides of the channel and continues until about HW at Esbjerg, 3 hours after HW at Helgoland. During the latter part of this period, the current inside the bar sets in a NE direction.

The ebb current begins about 1 hour 15 minutes after HW at Helgoland and sets NW. It attains a maximum rate of 0.5 at springs. During the first 2 hours, the ebb current sets straight out of the channel spreading towards the banks which line both sides of the approach. For the next 2 hours, it sets in a W direction. Then, for the remainder of the time, it sets out across the bar in a SW direction and turns S with the flood outside. This ebb current generally continues for some time after the water has started to rise.

HW and LW occur on the bar at Gradyb about 1 hour 15 minutes earlier than at Esbjerg.

Depths—Limitations.—Gradyb, the principal approach channel, leads NE between the banks fronting the N end of Fano and Skalling Ende, the S extremity of the Skallingen Peninsula. It then rounds the N end of Fano and leads SE between this island and the mainland to Esbjerg and Nordby.

A fairway, 220m wide, leads over the bar and has a dredged depth of 10.3m on the centerline. The sides of the fairway have a dredged depth of 9.8m.

The harbor is situated on the E side of the inner fairway channel and is comprised of several tidal basins. The main facilities are described below.

Fishing Harbor consists of six basins which provide 5,900m of total quayage, with depths of 4.4 to 7.5m alongside.

Trafikhaven has 1,620m of total quayage, including oil berths, with depths of 7.5 to 11.5m alongside.

Dockhaven has 1,025m of total quayage, with a depth of 6.7m alongside.

Englands Quay is 315m long and has a depth of 7.6m alongside.

Australian Quay is 286m long and has a depth of 10.5m alongside.

Europa Quay is 400m long and has a depth of 10.5m alongside.

Taurus Quay is 380m long and has a depth of 6.3m alongside.

There are facilities for bulk, container, ro-ro, general cargo, tanker, and LPG vessels. In addition, there are extensive installations for handling passenger ferries, fishing boats, oil and gas drilling platforms, and oil and gas exploration support vessels. Vessels up to 245m in length and 10.5m draft can be accommodated at HW.

Nordby Havn (55˚27'N., 8˚24'E.) is situated on the NE side of Fano, 1.5 miles SW of Esbjerg, and is accessible from the main fairway. This small harbor fronts a resort town and is used by ferries, small craft, and pleasure boats. Vessels up to 30m in length and 3.6m draft can be accommodated.

Esbjerg from SE

Aspect.—The various reaches within Gradyb are marked by lighted buoys. The fairway is indicated by lighted ranges and sector lights which may best be seen on the chart.

Gradyb Anduvning Lighted Buoy (55˚25'N., 8˚12'E.), equipped with a racon, is moored about 5 miles SW of the S end of the Skallingen Peninsula and marks the seaward entrance of the approach channel.

The Skallingen Peninsula is mostly low and appears from seaward as a continuous line of sand dunes.

A conspicuous power station chimney, with aeronautical obstruction lights, stands in the SE part of the port and another prominent chimney is situated 0.4 mile N of it. Prominent container gantry cranes are situated at a quay close SW of the power station chimney. A conspicuous water tower stands 0.6 mile NNW of the power station chimney. Prominent churches are situated 1 mile NNW and 1.8 miles NNE of the power station chimney.

Pilotage.—Pilotage through Gardyb is compulsory for tankers of 500 dwt and over and for all tankers carrying, or with uncleaned tanks which last carried, gas or dangerous chemicals. Pilotage for other vessels is not compulsory, but is advisable.

Requests for pilotage and an ETA should be sent 6 hours and 2 hours prior to arrival through Blavands (OXB). Pilots may be contacted by VHF and board about 1.5 miles SW of Gardyb Anduvning Lighted Buoy (55˚25'N., 8˚12'E.).

Regulations.—Vessels should contact the port on VHF channel 12 well in advance of their arrival and state their ETA, purpose of call, and nature of cargo. Vessels carrying danger-

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ous cargo must report by E-mail or fax at least 12 hours prior to arrival. The port control may be contacted by E-mail, as follows:

vagt@portesbjerg.dk

A Position Reporting System operates in the approaches to the port and is mandatory for all vessels over 100 grt. Vessels must report to the port control on VHF channel 12 when passing No. 1 Lighted Buoy and 2 Lighted Buoy (55˚25.6'N., 8˚13.8'E.), No. 13 Lighted Buoy and 14 Lighted Buoy (55˚ 28.5'N., 8˚20.9'E.), and on arrival at the harbor. The report must include the vessel's name, direction (inbound or outbound), position, draft, and name of Master. Vessels proceeding in the opposite direction must reply immediately so that a safe passage may be arranged.

Within the port, outbound vessels give way to inbound vessels. Gradyb is regarded as a narrow channel. However, the requirement for an inbound vessel to give way to an outbound vessel in a narrow channel, as per the Navigation Rules in Certain Danish Waters, applies only in that part of the channel crossing the bar.

Anchorage.—Anchorage can be taken, in depths of 6 to 9m, just inside the bar, but vessels must remain clear of the main fairway.

Caution.—During inclement weather, vessels should make sure that they are S and well clear of Horns Rev (55˚31'N., 7˚45'E.) before making an approach to the port.

An area, within which fishing and anchoring are dangerous due to the residual danger from mines, fronts the coast of Fano in the vicinity of Gradyb. This restricted area extends about 1 mile from the shore and may best be seen on the chart.

A prohibited area fronts the seaward side of the Skallingen Peninsula. It extends up to about 1 mile from the shore and may best be seen on the chart.

Spoil ground areas lie 2 miles N and 1.5 miles ESE of Gradyb Anduvning Lighted Buoy and may best be seen on the chart.

All depths in the port are maintained by dredging, but are subject to silting.

During winter, the outer channel lighted buoys may be withdrawn or replaced by unlighted and smaller buoys.

The channel buoys are frequently moved to meet changes of the sea bottom and the ranges and sector lights are modified accordingly.

Large vessels should attempt to arrive off the appropriate harbor basin at slack water in order to minimize the effect of the tidal current when berthing.

Listertief to Hanstholm (continued)

9.30 Blavands Huk (55˚33'N., 8˚05'E.), located 13 miles NW of Esbjerg, is a low point marked to the N and SE by sand dunes. A main light is shown from a prominent square tower, 39m high, standing on the point.

A conspicuous gun emplacement is situated 3 miles E of the light. A radio mast stands about 1 mile ESE of the light.

Horns Rev (55˚31'N., 7˚45'E.), marked by lighted buoys, consists of an extensive group of shoals extending about 21

Blavands Huk Light

miles W from Blavands Huk. These shoals, which form a serious danger to navigation, are divided into an inner part and an outer part by a channel with a least depth of 14.4m. This channel, which is marked by lighted buoys, is known as Slugen in its SE part and Normands Dyb in its NW part. It extends in a WNW direction from a position located about 4 miles S of Blavands Huk. A secondary passage, known as Soren Bovbjergs Dyb, branches in a N direction from Slugen, about 5 miles WSW of Blavands Huk, and has a least depth of 6m.

Depths on the outer part of Horns Rev, to the W of Nordmands Dyb and Slugen, range from 1.2 to 9m. Generally, the shallowest depths are found along a ridge which extends about 15 miles in an E and W direction along the N part of the shoal.

Horns Rev West Lighted Buoy (55˚35'N., 7˚26'E.) is moored about 22 miles W of Blavands Huk Light and marks the W and outer extremity of the shoals.

A prominent meteorological measuring mast, 60m high, stands on Munk Shoal, in the outer part of Horns Rev, about 10.3 miles WSW of Blavands Huk Light.

It is reported (2002) that up to 80 wind generators are being erected within an area lying on the outer part of Horns Rev.

Caution.—Wrecks that may suddenly rise up out of the constantly shifting sands are strewn over the entire Horns Rev shoal area. Some of these wrecks may contain explosives. Vessels are, therefore, advised not to navigate outside the marked channels, even though the charted depths may appear adequate.

Cautionary areas, the limits of which are shown on the chart, lie in the vicinity of this extensive shoal. They are centered about 10 miles SW, 15 miles SSW, and 10 miles ENE of Horns Rev West Lighted Buoy. Vessels should not anchor, trawl, or

conduct any bottom operations in these areas due to the residual danger from mines on the seabed.

A submarine cable extends W to the outer part of the shoal from a point on the shore located about 3 miles ESE of Blavands Huk Light.

9.31 The coast extending between Blavands Huk and Hanstholm, 98 miles N, is generally low and backed by sand dunes, but there are areas, particularly near the headlands, where cliffs rise up to 67m in height.

The NE part of the North Sea, which fronts this section of coast, is relatively shallow. The depths shoal gradually towards the shore over a bottom of sand and sand mixed with shells and stones.

Ice.—The E part of the North Sea that fronts this section of coast is never ice-covered. Ice forms off the coast as far N as Hanstholm, but it is usually of little significance and rarely causes any interruption of navigation.

Ringkobing Fjord is often closed to navigation because of ice. In Thyboron Kanal, leading to Limfjorden, there is never any solid ice cover, but navigation usually ceases here as soon as the inner waters of Limfjorden are frozen over.

Tides—Currents.—A constant current sets N and NE along the coast of Jylland. The current follows the coast as far as Hanstholm and then turns sharply ENE.

Off the S part of this area, the current is rather weak, setting only about 6 miles per day at Horns Rev. However, it increases in strength farther to the N. Between Blavands Huk and Hanstholm, the current is particularly subject to the effects of the wind and tidal currents. To the N of Blavands Huk, the effects of the tidal currents progressively decrease until N of Vorupor, when only the wind has any effect. Winds between the S and W generally increase the current, and winds between the W and N may stop it or even reverse the direction. To the N of Bovbjerg, the current sets N along the coast at a rate of up to 2 knots with W winds. With strong SW winds, this rate may reach 3 knots.

Although the rate of the tidal currents decreases rapidly to the N of Blavands Huk, there is a regular rise and fall of the tide; off Blavands Huk, there is a mean tidal rise of about 1.5m.

Caution.—A firing practice area extends about 9 miles NW from Blavands Huk and is marked by buoys.

A firing practice area extends about 8 miles W of Nymindegab (55˚49'N., 8˚12'E.) and is marked by a buoy.

Numerous wrecks, some dangerous, lie off this section of the coast and may best be seen on the chart.

Several submarine cables, which may best be seen on the chart, extend seaward from points on the shore located about 13 miles and 21 miles N of Blavands Huk Light and 6 miles SSW of Hanstholm Light (57˚07'N., 8˚36'E.).

Oil and gas submarine pipelines, which may best be seen on the chart, extend seaward to offshore installations from points on the shore located about 8 miles and 12 miles NNE of Blavands Huk Light.

A prohibited area, the limits of which are shown on the chart, extends 1 mile from the coast between Blavands Huk and Nymindegab (55˚49'N., 8˚12'E.), about 16 miles N.

A cautionary area, the limits of which are shown on the chart, extends 1 mile from the coast between Nymindegab (55˚49'N., 8˚12'E.) and a point located on the coast about 4 miles N of Lodbjerg Light (56˚49'N., 8˚16'E.). Another cautionary area, the limits of which are shown on the chart, extends seaward across the Skagerrak from a section of the coast between Lodbjerg Light (56˚49'N., 8˚16'E.) and Hanstholm Light (57˚07'N., 8˚36'E.). Vessels are advised not to anchor, trawl, or conduct any bottom operations in these areas due to the residual danger from mines on the seabed.

Lighted buoys, with tidal measuring equipment, may be frequently moored off this section of the coast.

9.32 Off-lying dangers.—Lille Fisker Banke (56˚48'N., 6˚21'E.), with a least depth of 31m, lies centered about 63 miles W of Thyboron Kanal. A rather extensive bank, with least depths of 25 to 27m, lies up to 20 miles S and SW of Lille Fisker Banke.

Jutland Bank (56˚47'N., 7˚15'E.), with depths of 14 to 36m, lies centered about 26 miles NW of Thyboron Kanal.

Ekofisk Oil/Gas Field (56˚33'N., 3˚13'E.) is situated 164 miles W of the entrance to Thyboron Kanal. It consists of an extensive complex of production platforms, gas and oil pipelines, and tanker loading systems. The SPM tanker loading systems are removed when the submarine pipelines to shore are operating normally, but installations remain on the seabed.

Numerous other oil and gas fields, with platforms, wells, and submarine pipelines, lie in the waters off the coast of Denmark and may best be seen on the chart. For more information, see paragraph 9.1 and paragraph 1.4.

9.33 Blabjerg (55˚45'N., 8˚15'E.), a prominent sand dune, stands 12 miles NNE of Blavands Huk. It is 64m high and rises above all the other dunes in this vicinity. This dune can easily be recognized by the three humps on its top.

Ringebjerge Beacon, 13m high, and Kaergaarde Beacon, 11m high, stand 4 miles and 9.5 miles, respectively, NNE of Blavands Huk. They are both prominent from seaward.

A church, with a prominent steeple, stands at Henne, 1 mile S of Blabjerg dune.

Holmsland Klit (56˚00'N., 8˚09'E.), centered 25 miles N of Blavands Huk, is a narrow strip of land which separates Ringkobing Fjord from the sea. It is fronted by two sandbars, the outermost lying about 0.3 mile offshore. The W side of this narrow strip is lined with sand dunes. On its S part, the dunes are low, but on its N part, they are high enough to hide the buildings standing behind.

Hvidesande Kanal (55˚49'N., 8˚12'E.), situated in the center of Holmsland Klit, forms the main approach to the fjord. A main light is shown from a prominent framework tower, 19m high, standing on the S side of the canal entrance.

The canal entrance is formed by two moles which are protected on their N side by a breakwater extending W from the shore. The entrance channel leads into a small harbor consisting of two basins. There is 300m of quayage, with a depth of 3.5m alongside. The harbor is mostly used by fishing vessels and small craft. The inner basin is connected to Ringkobing Fjord by a lock. The entrance channel is subject to frequent changes and vessels should not enter without local knowledge.

The lock leading into the fjord is 34m long and 16.5m wide, with a depth of 4m over the sill. Vessels more than 33.5m in length must be channeled through the lock at certain stages of the tide.

Hvidesande Light

Ringkobing (56˚05'N., 8˚15'E.) (World Port Index No. 30630), a small port, is situated on the N shore of the fjord, 7 miles NE of the canal. The harbor is approached through a channel, 20m wide, which is marked by perches and has a depth of 2.4m. It consists of two basins, with depths of 2.5 to 3m, and is mostly used by fishing vessels, small craft, and pleasure boats. There is a quay, 149m long, with a depth of 2.7m alongside. Several yacht marinas are situated within the fjord near Ringkobing.

Havrvig Beacon, 11m high, and Argab Beacon, 12m high, stand 5 miles and 0.8 mile, respectively, S of the canal entrance. Both beacons are prominent from seaward.

A church, with a small pointed tower, is situated at Gammelsogn, 7 miles NE of the canal entrance, and another church, white with a dark roof, is situated at Nysogn, 8 miles NNE of the canal entrance.

Lyngvig Light

9.34 Lyngvig Light (56˚03'N., 8˚06'E.) is shown from a prominent tower, 38m high, standing 3 miles N of the canal entrance.

Husby Klit Beacon, 12m high, and Vederso Beacon, 11m high, stand 8 miles and 12.5 miles, respectively, N of Lyngvig Light. A church, white with a dark roof, is situated at Husby, 14.5 miles N of Lyngvig Light.

Torsminde Havn (Thorsminde Havn) (56˚22'N., 8˚07'E.), a small fishing harbor, is situated within the channel which provides access from the North Sea to Nissum Fjord, 19.5 miles N of Lyngvig Light. The intervening coast is backed by sand dunes, which attain heights up to about 27m.

A main light is shown from a framework tower, 25m high, standing near the harbor entrance. A conspicuous windmill, 32m high, is situated close ESE of the light. The entrance channel is 40m wide and has a depth of 3m. Vessels up to 40m in length, 8m beam, and 3m draft can be accommodated at HW. The harbor is blocked about 0.2 mile inside the entrance by sluices which control the level of water in the fjord. A road bridge spans the harbor close W of the sluices. Small craft can enter the fjord through the sluices only when the water levels of the sea and the fjord are equal or almost equal.

The coast between Torsminde Havn and Thyboron, 21 miles N, is backed by low sand dunes.

Bovbjerg Light (56˚31'N., 8˚07'E.) is shown from a prominent tower, 26m high, standing on Bovbjerg, a prominent dune, 38m high, which rises 8.5 miles N of Torsminde Havn.

A conspicuous factory chimney stands about 9 miles NNE of Bovbjerg Light and several prominent churches are situated along this section of the coast.

Caution.—Between Torsminde and Lodsberg (56˚49'N., 8˚16'E.), numerous remains of bunkers and defense installations lie along the seabed, close off the coast.

Bovbjerg Light

Limfjorden

9.35 Limfjorden (56˚43'N., 8˚13'E.), the comparatively-shallow waterway cutting through the N part of Jylland, consists of a series of irregular bays connected by narrow sounds. It extends in a NE direction from Thyboron (56˚42'N., 8˚13'E.) on the North Sea to Hals on the Kattegat. The W entrance of this waterway is formed by the Thyboron Kanal.

Limfjorden cuts through Jylland and converts the N part of that peninsula into an island. Several towns, villages, and load-

ing places are situated within this waterway. The main fairway within the waterway is 91 miles long.

Aalborg, the principal port of Limfjorden, lies about 16 miles within the E entrance at Hals. A description of this port and the E entrance may be found in Pub. 193, Sailing Directions (Enroute) Skagerrak and Kattegat.

Thyboron (56˚42'N., 8˚13'E.) (World Port Index No. 30460), a small town, stands near the N end of Harboore Tange and is fronted on its inner side by a harbor. A church, with a prominent thin tower, stands in the town. Harboore Tange, a low and sandy tongue, extends NNE from a position located about 7.5 miles N of Bovbjerg Light. This tongue separates the S part of Nissum Bredning from the North Sea and is protected by groynes on its W side. The W entrance to Limfjorden, which is known as the Thyboron Kanal, leads between the N end of Harboore Tange and a breakwater extending seaward from the S end of Agger Tange.

Agger Tange, composed of sand and pebbles, is a low tongue of land which separates the N part of Nissum Bredning from the North Sea. It is about 5 miles long, protected by groynes on both sides, and often flooded at HW during storms.

A main light is shown from a framework tower, 17m high, standing near the N extremity of Harboore Tange. An outer lighted buoy, equipped with a racon, is moored about 2.5 miles W of the light and marks the bar.

The entrance fairway is indicated by lighted ranges and has a dredged depth of 6m over the bar (2000).

Thyboron Havn is entered directly from the canal. It provides about 1,000m of total commercial berthage, with depths of 5 to 6m alongside. Vessels up to 100m in length, 15m beam, and 5.5m draft can be accommodated.

Limfjorden is entered via the Thyboron Kanal. The depths in the waterway between the W entrance and the port of Aalborg vary considerably. The main fairway is reported (2000) to have a least depth of 4m. Vessels with drafts up to 3.8m may transit the waterway.

Tides—Currents.—At Thyboron, the tides rise about 0.4m at springs and 0.3m at neaps.

Off the entrance to the Thyboron Kanal, the tidal currents change regularly in fair weather. The flood current becomes established 3 hours 30 minutes before local HW and continues until 4 hours after. The ebb current usually lasts for 5 hours. Winds between S and W strengthen and increase the duration of the N flood current and sometimes overcome the S ebb current entirely. Winds from between N and E increase the duration of the ebb current. The currents normally attain rates of about 2.5 knots.

Within the Thyboron Kanal, the water level is affected by the wind. Winds from W can raise the level by up to 1.3m and winds from E can lower it by as much as 1.2m. The difference between the water levels inside and outside the canal may be considerable. This condition, in conjunction with prolonged E of W winds, may cause a continuous incoming or outgoing current to persist for several days. Under these exceptional conditions, the current has attained a rate of 6 to 8 knots.

Ice.—There is never a solid ice cover in the canal, but navigation stops as soon as the inner waters are frozen over. The inner waters of Limfjorden are susceptible to freezing; in severe winters, this may occur between the middle of December and the early part of April. Navigation may be impeded for a period of up to 3 months and may be stopped entirely for up to 2 months.

Regulations.—Special regulations for navigating in Danish inner waters are in force within all of Limfjorden and its entrances. Generally, inbound vessels, having sounded one long blast to indicate entering, take precedence over outbound vessels.

The fairways through Limfjorden are marked in accordance with the Danish system for minor passages.

Pilotage.—Pilotage is compulsory for vessels over 200 grt or 35m in length. It is recommended for all vessels without local knowledge. Vessels should sent an ETA and a request for pilot at least 6 hours in advance. Pilots may be contacted by VHF and board close outside the entrance bar whenever the weather conditions permit.

Caution.—Depths over the outer bar constantly change and the authorities should be contacted in order to ascertain the latest information.

The sea sometimes breaks on the outer bar during W gales. However, safe entry can usually be made in all weather conditions.

Due to silting, depths within Thyboron Havn may be up to 0.5m less than charted.

Lodbjerg Light

Listertief to Hanstholm (continued)

9.36 The coast extends 28 miles NNE from Thyboron to Hanstholm. During the fall and winter months, parts of this low coast may be inundated and flooded at HW, especially with strong W winds.

Lodbjerg Light (56˚49'N., 8˚16'E.) is shown from a prominent tower, 35m high, standing on the dunes, about 7 miles NNE of Thyboron.

The coast extending between Lodbjerg and Norre Vorupor, 9 miles NNE, consists of dunes. These dunes are low in the vicinity of Norre Vorupor, but otherwise fairly high. Stenbjerg

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Hanstholm Light

Beacon and Torup Beacon, 11m high, stand about 6.5 miles and 11 miles, respectively, NNE of Lodbjerg Light. Prominent churches are situated at Norre Vorupor and 0.6 mile ENE of Stenbjerg Beacon.

A detached breakwater, 2m high, is situated at Norre Vorupor and protects a landing place for boats. It extends 310m NW from a position close offshore and is connected to the coast by a piled pier, 115m long.

Orhage (57˚03'N., 8˚29'E.), a prominent promontory, is located 6 miles NE of Norre Vorupor. A shallow rocky ledge fronts the NW side of this promontory and a spit lies close S and parallel to it. A conspicuous church, red with a slate roof and no tower, is situated at Klitmoller, 0.5 miles E of the promontory.

Hanstholm (57˚07'N., 8˚36'E.), the NW extremity of the Danish mainland, is formed by a broad chalk and limestone promontory which rises steeply from the sea.

A main light is shown from a prominent tower, 23m high, standing on Hansted, the NW part of Hanstholm. Hjertebjerg, the summit of the promontory is 67m high and rises about 2 miles SE of the light.

The boundary between the North Sea and Skagerrak extends seaward from Hanstholm to Lindesnes (57˚59'N., 7˚03'E.).

For a description of the coast extending E of Hanstholm Light, including Hanstholm Havn, see Pub. 193, Sailing Directions (Enroute) Skagerrak and Kattegat.